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Just below the "Ebb and Flow" spring on the property of the Marlbrook Lime Co. at Rockbridge County, Va. The dissolved limestone in the waters on precipitation at the surface formed the marl quarry worked by the company

Loading cars in a section of the marl quarry. In some places the face of the quarry is over 90 ft. high

Unique Rock Products Operation in Valley of Virginia

Marlbrook Lime Company Drys, Pulverizes and Markets Both Marl and Limestone

THE valley of Virginia is famous for its beauty and scenery and many interesting natural phenomena such as Natural Bridge, Luray and Shenandoah grottoes and other caverns. The same natural conditions that made these caverns are responsible for a rather unique operation of interest to limestone producers.

In Rockbridge county, on the property of the Marlbrook Lime Co. of Roanoke, Va., a large subterranean stream comes out of a limestone mountain at what is called the "Ebb and Flow Spring." Owing to a peculiar cavern formation this spring discharges a full stream of water for seven minutes and stops entirely for seven minutes when a sudden inrush of air releases the water again, causing it to alternately flow and stop at intervals of exactly seven minutes. The action is evidently caused by a natural underground syphon. It is said there are only two or three such springs in this country.

The water of this underground stream, seeping through a solid limestone bed, dissolves the soluble part of the stone and brings it to the surface, where a change of temperature and other conditions cause a part of it to be precipitated. This has no doubt been going on for centuries and the topography of the ground is such that a large deposit of this precipitated fresh water marl has collected in a mountain gorge until today there is a precipice of more than 100 ft. of this marl over which the water falls. The deposit of marl began on the limestone bed and has gradually raised the level of the stream. The workmen in the quarry often find bones, petrified leaves and other evidences of previous life as deep as 75 or 80 ft. below the surface. There are caves all through the deposit and some of the marl is quite hard, but most of it is soft and porous, to such an extent that a dry lump of it will asborb 50% of its own weight in water. This material, called "Lime-Marl" to the trade, analyzes above 96% calcium carbonate and is sold almost entirely for agricultural purposes.

In 1912 the Marlbrook Lime Co. began work on this deposit where it crosses the Norfolk and Western railroad, and has worked out the marl for a quarter of a mile up the stream and now has a marl quarry with a 90-ft. face. The marl is blasted down and loaded on Western cars and a Burton locomotive hauls them to the plant. From a McLanahan single-roll primary crusher the marl goes to a 5-ply 60-ft. rotary dryer. After being dried the marl is put through a 9-ft. dry pan and the tailings from the screen are pulverized by an Allis-Chalmers pulverizer. From the pulverizer the marl is elevated and conveyed to the loading bins or ground storage. These bins hold about 50 cars and are served overhead and underground by Jeffrey

Face of the stone quarry operated in conjunction with the marl deposits

Stripping operations are carried on during the winter

Loading bins and ground storage

Rotary dryer, under shed at left

A part of the plant is used for crushing limestone

Storage bins which hold the material under cover

spiral conveyors.

In addition to the marl, the company also quarries a high grade limestone and operates a crushing and pulverizing plant which is a separate unit, but embodied in the same plant. Either unit can be run separately or both together. The limestone quarry is next to the marl quarry and the same narrow gage railroad serves both quarries, the marl cars and stone cars being run down on the same train and are switched to different tracks at the plant. An Erie steam-shovel loads the stone at the quarry. The air and drilling equipment is Ingersoll-Rand. The stone is used for industrial and road work and the dust is pulverized by an Allis-Chalmers pulverizer for agricultural purposes.

R. H. McCormick is superintendent and has been with the company since it first began work.

The same company operates another "Lime-Marl" plant at Charlestown, W. Va., on the Baltimore and Ohio railroad under the name of the Natural Lime-Marl Co. This operation has a daily capacity of 100 tons per 10-hour day and a bin storage of 100 cars. Practically the same kind of equipment is used here as at Marlbrook. B. F. Benner is superintendent and Paul H. Jamison, Roanoke, Va., is general manager.

Work of the Fire Underwriters' Laboratories on Rock Products

THE work of the Underwriters' Laboratory, maintained by the National Board of Fire Underwriters, has a very important bearing on all rock products used as building materials. The fire-resisting property of building materials is becoming a more and more important consideration, and good fire-resistance is one of the best sales arguments. Herewith are some extracts from a report of the activities of the Underwriters' Laboratories for the year 1926, insofar as they refer to rock products:

"Important and interesting problems in the investigation of building materials have been presented to this department during the year. The continued improvement in equipment for testing, the recognition by national engineering organizations of a set of standard fire test specifications, and the increasing desire on the part of inspection authorities for definite information regarding the fire resistive properties of the major materials used in the construction of buildings make it practicable and desirable that work in this field shall constitute an increasing proportion of our activities.

Standard Specifications for Fire Tests

"The standard specifications for fire tests of building construction and materials require that bearing walls and bearing partitions shall be subjected during fire and fire stream test to such loading as will impose upon the members the working stresses contemplated by the design. Furthermore, after the fire stream test, it is required that a wall or partition shall be subjected to a live load amounting to double the live load carried during the exposure to fire.

"One of the large test furnaces has been provided with three panels adapted for such tests of bearing walls and bearing partitions, and several tests of walls have been made with the new equipment. The results indicate that the apparatus is suitable and that a means is now available for direct determination of the effect of fire and load, which supplants earlier methods requiring rather elaborate study of the detailed effect of exposure to fire and to fire stream together with theoretical analysis of the manner in which load would be distributed over the undamaged portion of the wall or partition.

Hollow Concrete Blocks

"The use of hollow concrete blocks in the construction of walls has become rather common in buildings of moderate height. During the past five years the Laboratories have published a large amount of information regarding the effect of fire on concrete blocks, and during 1926 have obtained and distributed important additional evidence made available by the use of the new test apparatus. Three fire-and-load tests of concrete block walls have been made and reported, and they have produced information regarding the effect of fire and load on new forms of block and on blocks having coarse aggregate differing from the aggregates used in earlier tests. It appears that a considerable amount of further test work on concrete units is now in prospect, at least a portion of it being on blocks of smaller size and with thinner webs and walls than those already reported upon.

Wall Boards

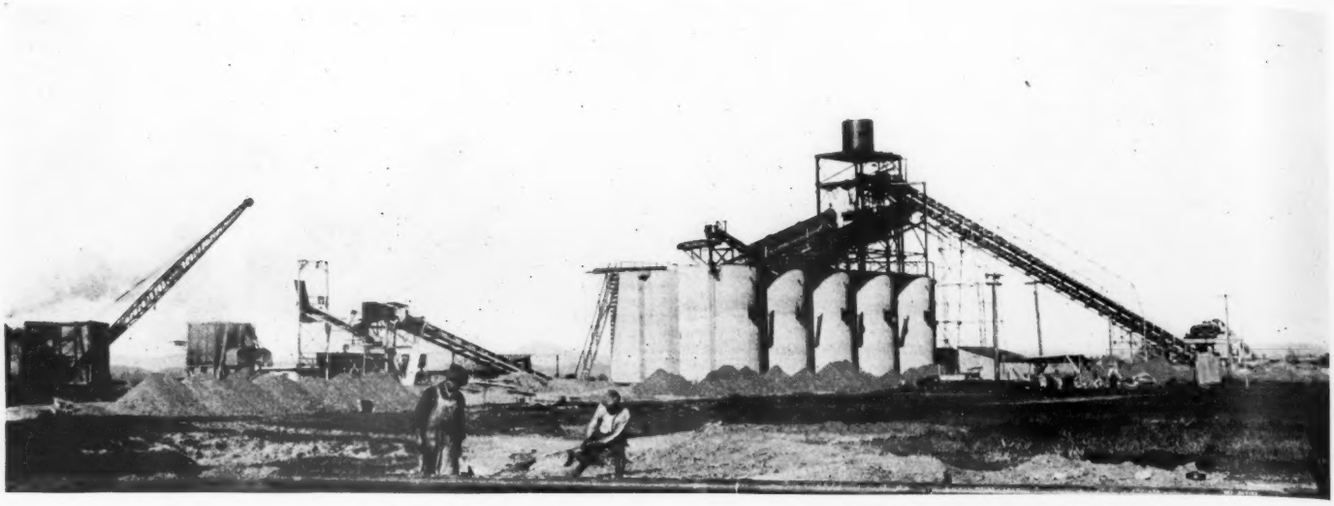
"Gypsum wall boards designed to be nailed to wood studs as finish for partitions continue to be used in large quantities. During the year two tests of materials of this kind have been made in the large panel furnace on partitions 10 ft. wide and 11 ft. high; several tests have been made in a smaller furnace on test panels 6 ft. square; and a large amount of experimental work has been done with a furnace of special design in which small sheets of wall board are tested singly. The evidence thus far available indicates that such small scale tests are likely to be useful as routine checks upon the quality of wall boards in commercial production, standard tests upon large panels serving as the ultimate basis for opinion regarding the fire retardant properties of the material.

Gypsum Plaster

"The use of lime plaster on wood lath as an interior finish, formerly common, is now relatively infrequent, gypsum plaster on wood lath being used in a large proportion of the frame buildings and ordinary brick buildings erected in recent years. During 1926 the Laboratories subjected to fire test a partition constructed of wood studs with wood lath and gypsum plaster, and are publishing a definite retardant classification for such an assembly.

"Some so-called plaster boards or plaster bases designed to be used instead of lath as a base upon which plaster finish is to be applied have been tested, and further tests upon other materials to be used in this manner are in preparation.

"Fire tests of walls, partitions and finish in large panels have been made at an average rate of about one per month."



Eliot plant of the Rhodes-Jamieson Co., near Pleasanton, California. The dewatering and crushing plant shows at the extreme right

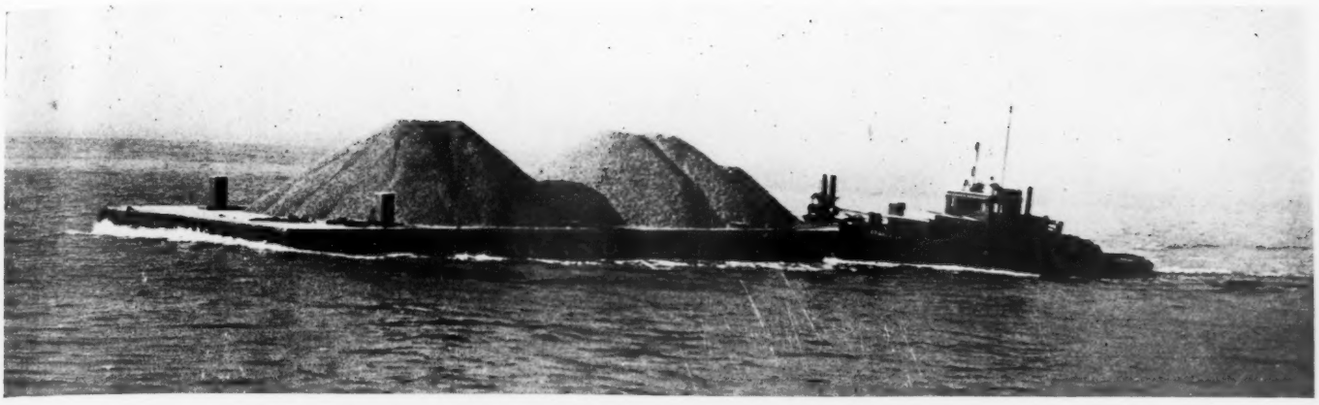
Plant of the Rhodes-Jamieson Company at Eliot, California

One of the Newer Pacific Coast Plants Producing Crushed Rock, Gravel and Sand

THE Rhodes-Jamieson Company operates a building supply business in Oakland, Alameda and Berkeley, Calif. They also operate three sand and gravel dredges on the Sacramento river and a plant at Eliot, near Pleasanton, Calif. The last named was built in the latter part of 1925 and hence is one of the newer plants of the Pacific coast.

At Eliot, which is about 40 miles from San Francisco, there is a great plain of sand and gravel worked by several companies. The cableway dragline is a favorite machine in this field, but the Rhodes Jamieson Co., finding water level at a convenient distance below the surface, installed a pump dredge. To insure an ample supply of water part of that used to float the dredge comes from deep wells on the property. So far as is possible all the water pumped with the sand and gravel is returned

Dredge at the Eliot plant which contains a 12-in. pump and 400-hp. variable speed motor



Sand is delivered by barges to points around San Francisco bay

to the pit to be used again in pumping.

The hull of the dredge is 80 ft. long and 26 ft. wide. The centrifugal pump has a 12-in. discharge and is driven by a 400 hp. variable-speed motor. The transformers for the high voltage current are placed on the dredge as well as the resistances for the motor. Controls are in a pilot house on the upper deck. The pump was made by the American Manganese Steel Co. and the motor by the General Electric Co.

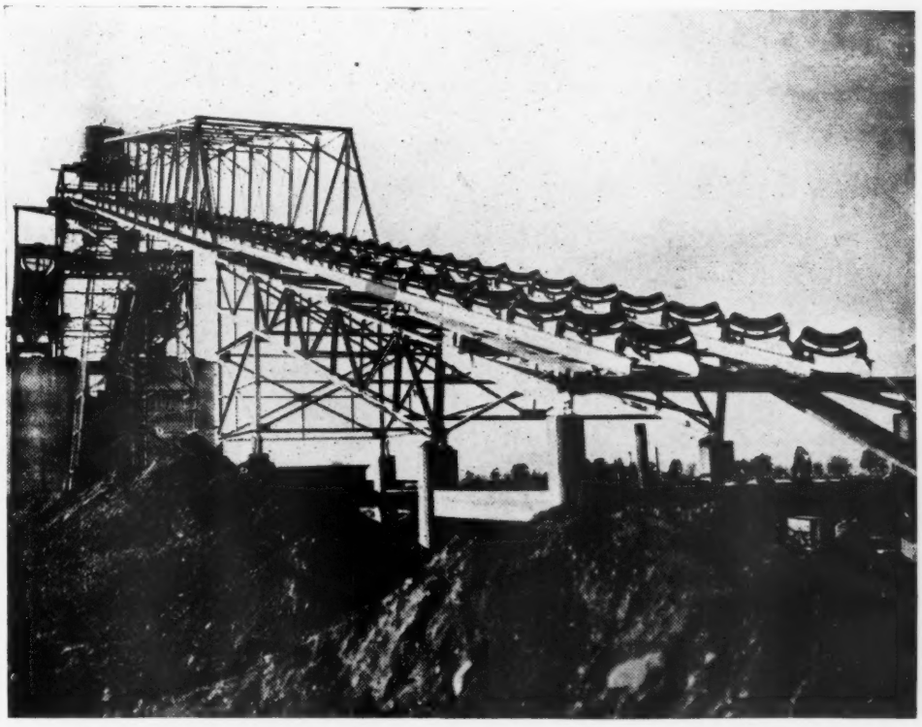
The pump discharge goes to a large cylindrical screen made by the Billing-Bodinson Mfg. Co., which is used for taking out the sizes of material which do not require crushing. The oversize of the screen goes to a Kennedy Van Saun gyratory crusher and a Symons disk crusher.

In common with the usual practice in California plants the crushed oversize is kept separate from the gravel and sold as a separate product. For this reason there are two belt conveyors which take the through product of the first screen and the discharge of the crusher separately to the screening plant.

All the water that accompanies the material pumped from the pit of course goes through the screen with the gravel and sand. This water is overflowed by a concrete sump that receives the screen discharges which also carry the sand. The sand is pumped to sand settlers that discharge into bins.

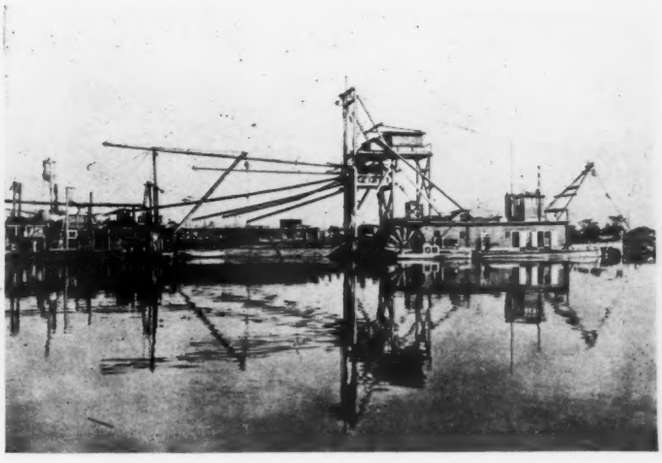
The gravel left behind falls by gravity on conveyors and is sent to the screening plant.

The conveyors are carried on a 320-ft. steel structure stiffened with a bridge truss so that supporting towers are needed only at the ends. They run to two lines of Dull conical screens, one for the crushed stone

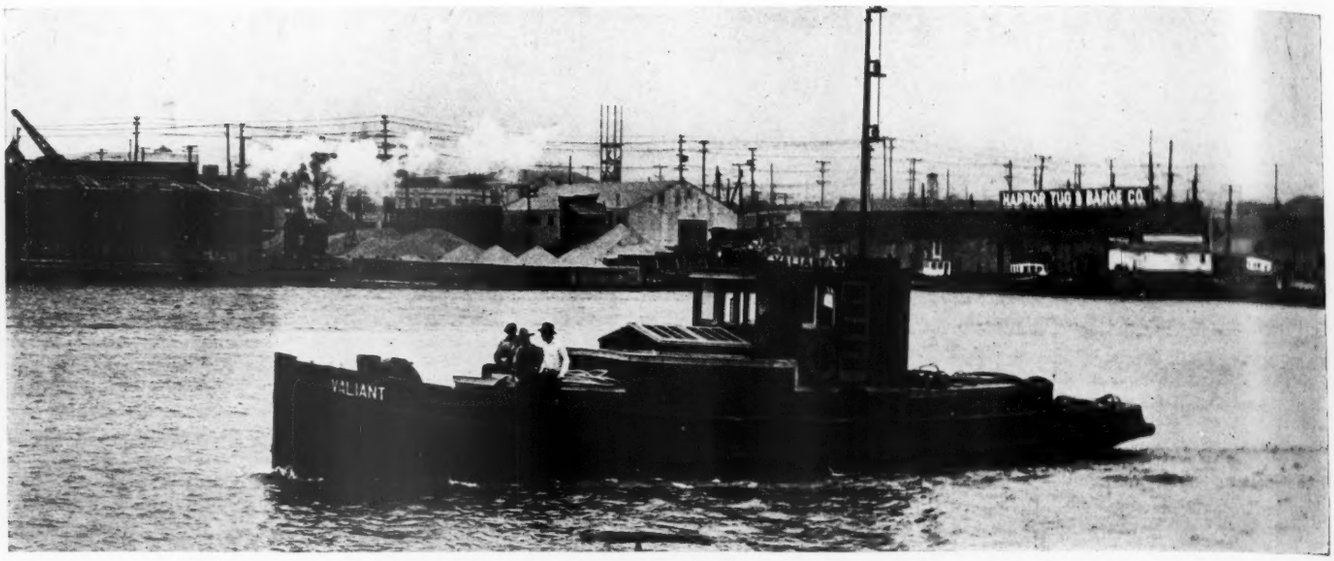


The well designed steel bridge that holds the two conveyors at the Eliot plant

Tugboat "Elk" on the Sacramento river



Rhodes-Jamieson dredge on Sacramento river



Water front of Rhodes-Jamieson wharf at Oakland

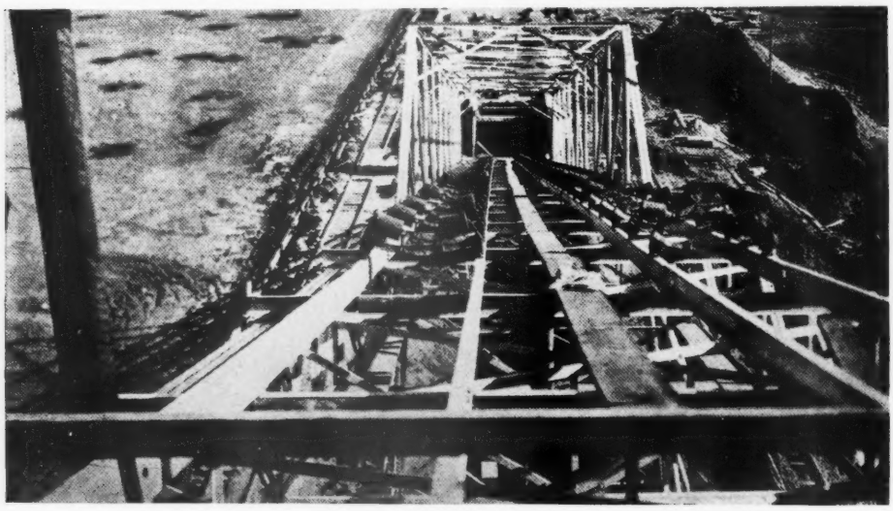
and one for the sand and gravel. Water for washing is supplied here through spray pipes.

The bins of this plant are of the silo type and are 20 ft. in diameter and 40 ft. high. Two large silos at the end are used for the storage of sand. The super-structure which carries the screen lines above this is all of structural steel. In fact, almost the entire plant is of concrete and steel construction.

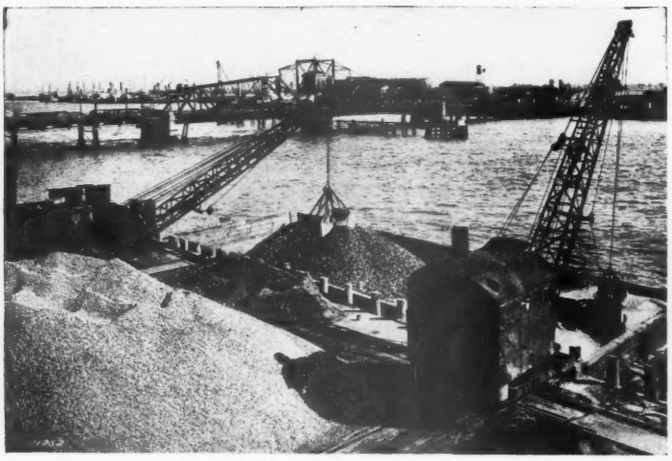
The loading arrangements are such that either trucks or railroads' cars may be loaded. Ground storage has been provided and the material is handled in and out of the storage piles by a locomotive crane. Over two miles of sidetrack serve this plant.

The plant is one of the best that has been built in the last year or two in point of both construction and equipment. The screening equipment was all made by Meese and Gottfried, the San Francisco branch of the Link-Belt Co.

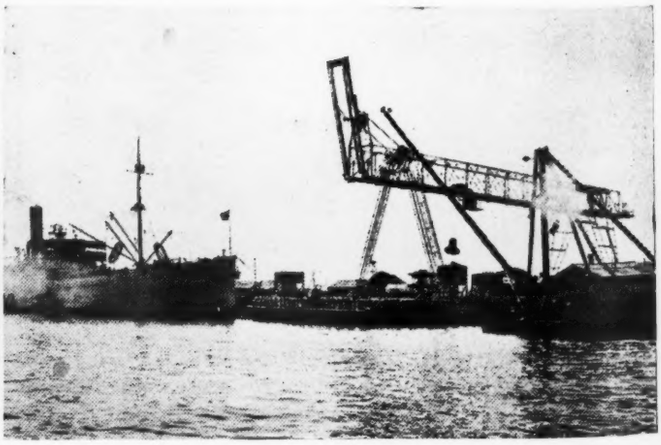
The growth of the Rhodes-Jamieson Co. is worth noting here, as it illustrates how rapidly success is attained in some of the rock products industries when to industry and integrity are added the opportunities that present themselves in a rapidly growing city. The concern originally started as a wood and coal concern in a small shack in Alameda. About two years later came the fire which destroyed so much of San Francisco and when the demand for building materials grew heavy it found them with a stock on hand. Then they began to build yards and buy out others until the business grew to its present large proportions. The first sand and gravel dredge operated by this company was on the Sacramento river, where



Looking down on conveyor structure from screening plant



Unloading gravel from barges at the Oakland wharf



Gantry crane used for handling material at West Alameda

now the company has three dredges. Material from these is brought down to San Francisco by a fleet of nine barges and four tug boats. Then the plant at Eliot was built. The size of the business may be judged from the fact that a fleet of 48 motor trucks is

A. G. Rhodes (left) and G. G. Jamieson

kept busy with deliveries from the various yards operated in the East San Francisco bay towns.

G. G. Jamieson is president of the company, A. G. Rhodes is vice-president and G. L. Richards is secretary-treasurer. R. C. Wilcox and A. I. Markwell are directors. The company's main offices are on Broadway wharf, Oakland, Calif.

Standardizing Aggregate Names

[EDITOR'S NOTE: The following is from *Sunshine Service,* organ of the United Fuel and Supply Co. of Detroit. It is an attempt to put an end to the confusion that comes from customers having different names for the same material. The names given here are so local that they cannot be universally adopted, but the idea of standardizing can be applied anywhere.]

TO our customers, individually, there is nothing either mysterious or complicated about aggregates. Each of you has a clear, definite and perfectly plain name and description for the kind and quality of aggregates that you order for any particular purpose.

Here's the problem that we have been up against. The contractor wants sand for plastering. He will call up and specify, not plastering sand, but any one of three or four different names. Another wants sand for concrete work. He will specify the kind of sand he wants by a certain name. Two or three other contractors, ordering sand for concrete work, exactly the same *kind* of sand, will each give it a different name. And so on.

The result has bene that we have been forced to educate every man in our organization to an understanding of the several different names for each kind of aggregate.

But that is not all. Some contractors use the same description or name for a sand required for plastering purposes that other contractors use for mason work and vice versa. Yet they mean *different* kinds of sand.

The following names have been accepted as standard by us. As mentioned before, you will use them, you will not only enable us to give you exactly what you want, but will aid us to give you completely satisfactory service at all times. You can also order by number given, if you so desire:

1—*Silk Sand*—A river material and the finest sand we carry. It is finer than our flat sand, but too fine for concrete aggregate. Used principally as a sand finish for walls and for making artificial stone where its characteristic fineness gives the block or product a close-grained appearance similar to the genuine stone. Also for light joint in brick work and for tile and marble setting.

2—*Flat Sand*—A river sand ranging between a silk sand and a plastering sand. Used by some contractors to make mortar for tight joint brick work. Ordinarily its mortar is not considered as strong nor as permanent as mortar made from plastering sand. Used also in sand finish work and block laying.

3—*50/50 Sand*—This is the grade of sand generally accepted as best for brick mortar and is also used for exterior stucco. It is made by mixing sharp sand and flat sand in such proportions that the product is maintained at a uniformly correct grading and constant quality. Our experience is that this and usually has a modulus of fineness of approximately 2.5.

4—*"United" Plastering Sand*—This sand is of the same fineness and proportions as 50/50 sand, but is of superior quality as regards cleanliness and freedom from all foreign matter.

5—*River Sharp Sand*—Contains more of the larger sieve sizes than flat or plastering sand, grading up to ⅛ in. Used in plaster mills and as an aggregate for special concrete or cement work where larger sizes would be detrimental. Also used in exterior stucco work and for laying brick in sewer work.

6—*Granite Sand*—A special clean pit sand similar to sharp sand, but containing a percentage of fines. Slightly coarser than the river sand, but can be used for the same purposes. Particularly suitable as top dressing for concrete floors.

7—*Pit Sharp Sand (Torpedo)*—A sharp sand, including a proportion of pebbles from ⅛ in. to ¼ in. An excellent fine aggregate for all kinds of concrete. Used chiefly on work where fine and coarse aggregates are ordered separately for mixing at the job, and for basement floors, sidewalks, etc.

8—*White Silica Sand*—A special pure white sand shipped in bags. Because of its higher cost, it is used only in such work as requires a fine white appearance as—setting tile, or where used with white cement, the manufacturr of imitation marble and stone, white sand finish, etc.

9—*"United" Balanced Aggregate*—A complete concrete aggregate supplied as an alternative for 60/40 gravel. It is made from crushed limestone properly proportioned as to size and mixed with river gravel. Used in such concrete as goes into mats. footings, columns, slabs, fireproofing for structural steel, floors, walls, etc., whether with or without reinforcing.

10—*60/40 Gravel*—This is an artificially mixed gravel from the pits. It grades from 1 in. pebbles down, contains both the coarse and fine aggregate and is so proportioned in size and grading that only the addition of cement and water is required for the concrete. The uses for concrete made from 60/40 gravel are the same as for balanced aggregate described above.

11—*1 in. Pebbles*—Clean, hard pebbles graded from ¼ in. to 1 in. Used by the D.P.W. and others for sewers, curbing, sliver work, sidewalks, etc.

12—*2 in. Pebbles*—Are the same in character as 1 in. pebbles, but graded from ¼ in. to 2 in. Used in one-course street and alley paving, the bottom course of two-course work and as coarse aggregate for concrete where fine and coarse aggregates are separated. Somtimes used for grade separation work and in the bottom of macadam roads.

13—*Limestone Screenings*—Graded from ¾ in. down. Used on driveways, surface for schoolyards and playgrounds, etc.

14—*1 in. Calcite Stone*—Is crushed limestone graded from 1 in. to ¼ in. Used principally as coarse aggregate for our balanced aggregate and for the same purpose as 1 in. pebbles where specifications permit.

15—*2 in. Calcite Stone*—Is crushed limestone graded from 2 in. to ¼ in. An excellent and economical coarse aggregate for concrete. Also used for gradings, ballast and fill.

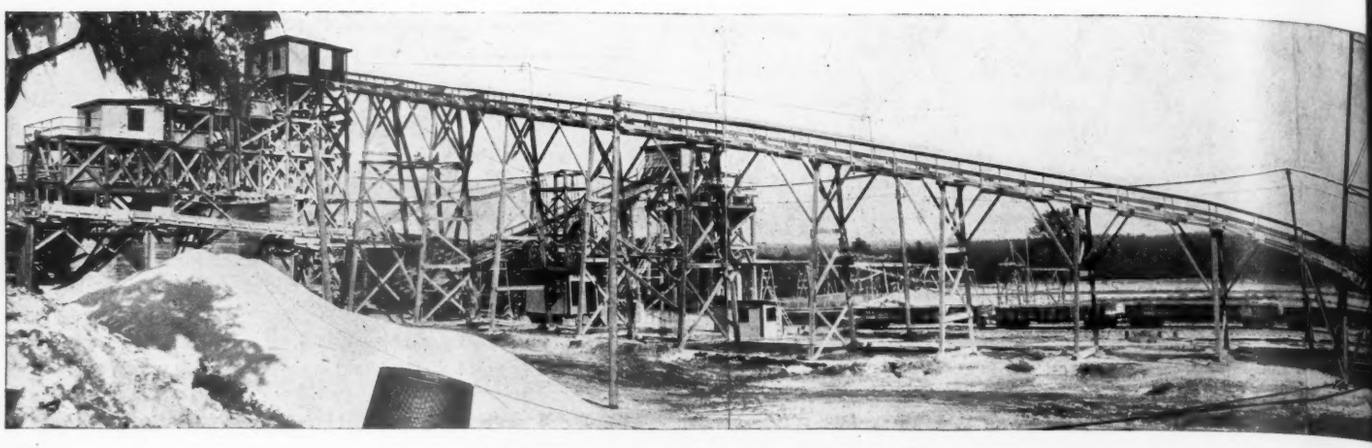
16—*Sturgeon Bay Binder*—Sturgeon Bay limestone graded from ¾ in. down. Used with a binder for asphalt surfacing macadam roads, driveways, etc.

17—*2 in. Sturgeon Bay Stone*—A specially hard limestone graded from 2 in. to ¼ in. Used as aggregate for concrete in one-course street and alley paving work, bottom course of two-course work, grade separations, macadam roads and coarse aggregate in special concrete work.

18—*2 in. Rockport Stone*—A hard Michigan limestone graded from 2 in. to ¼ in. Used as aggregate in concrete for the bottom course of two-course work or asphalt covered street and roads.

19—*Roofing Gravel*—A river or pit material composed of fine, clean, hard pebbles graded from ½ in. to ⅛ in. Used with a binder on gravel roofs, and under special conditions as coarse aggregate for concrete.

20—*Block Gravel*—A complete aggregate. Includes all sand and pebbles up to about ⅜ in. It is washed free of sufficient fine sand to make the balance a very suitable aggregate for the manufacture of concrete products such as block, tile and pipe.



Primary crusher at extreme right, scrubbing screens and log washers in center

A Florida Plant for Washing Limestone

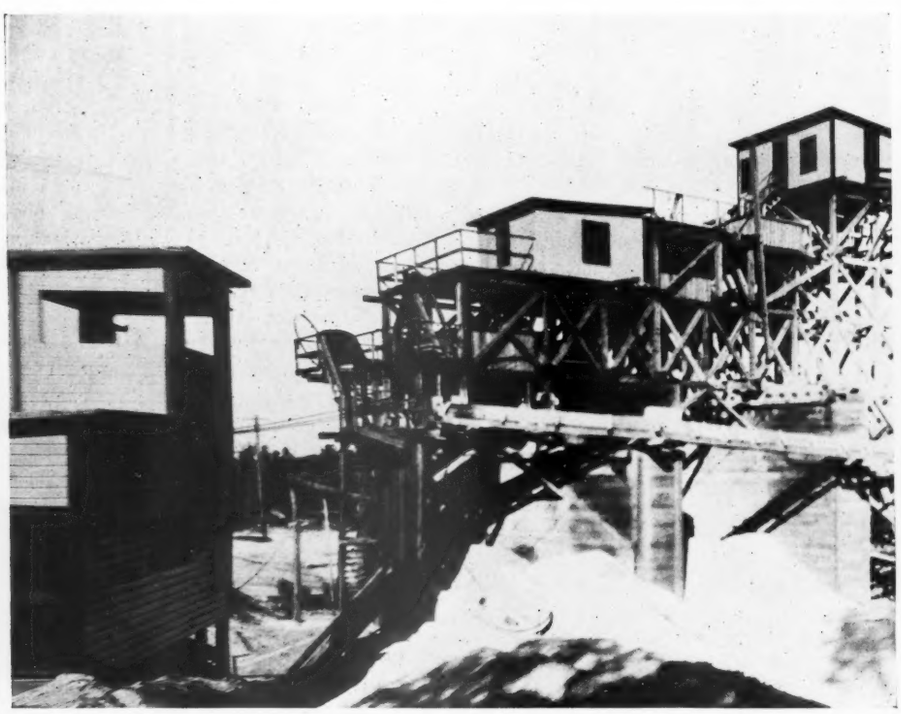
Operation of the Consolidated Rock Products Co., near Brooksville, Fla.

By Frank M. Weakley

Of Consolidated Rock Products Co., Lakeland, Fla.

THE Consolidated Rock Products Co. owns and operates two quarry plants in the state of Florida; the "soft rock" plant in Sumter county near Istachatta, and the "hard rock" plant in Hernando county, near Brooksville.

The soft rock plant works the Ocala limestone. This stone is relatively soft, and is used entirely for the construction of roads. The stone is soft enough to be broken up and compacted by a 10-ton roller when spread over a roadbed. When properly worked, it makes a hard, smooth base which, when waterproofed by a surface treatment of asphalt, holds up very well under traffic. All of the output of this quarry is used by the Wm. P. McDonald Construction Co. in its road work. Wm. P. McDonald owns a controlling interest in the Consolidated Rock Products Co.



Screening plant and tower for operator of storage drag scraper bucket

At the soft rock quarry, the rock is drilled with a gasoline-engine-operated well drill and is shot by 30% dynamite. The rock is loaded in skip cars with 1-yd. Diesel-operated shovels. The cars dump directly into a roll crusher which makes a primary reduction. The primary crusher discharges directly into a second roll crusher, which in turn discharges into railroad cars.

This plant is built to eliminate breakdowns so far as possible. The equipment is in duplicate; there are two shovels and four track inclines operated by two hoists. The machinery is operated by two Diesel engines of sufficient capacity to permit one to operate the entire plant, at slightly reduced production. Should one of the crushers break down, the other can, with slight adjustments, make the necessary reduction of the rock.

The soft rock plant is very simple and resembles the other plants in this field except that having the equipment in duplicate is somewhat out of the ordinary.

The hard rock plant is quarrying the Tampa formation. This rock consists of a hard limestone of a semi-crystalline nature existing mostly as boulders in a matrix of very soft lime and some clay. As this rock is used entirely for concrete aggregate, it is necessary to wash it thoroughly to eliminate all of the soft material. Practically the entire output of hard rock produced in the state of Florida comes from the Tampa formation, and the character of the rock is such that a rather elaborate plant is required to crush and clean it.

This Tampa rock is quarried by drilling holes with an electrically operated well drill

building and screening plant at left. The loading conveyor shows in the background

and shooting with black blasting powder. The rock is loaded into 6-yd. side dump cars by a 3-yd. electric shovel. The cars are hauled up an incline and dumped into a roll crusher. This, the primary crusher, discharges onto a pan feeder which feeds onto a 36-in. conveyor. This conveyor carries the rock to a pair of combination screens and scrubbers 60 in. in diameter and 30 ft. long. These give the rock a preliminary washing and screen it into three sizes; the first size, up to 1½ in., dumps into a pair of log washers; the second size, from 1½ in. to 2½ in., dumps into a double roll crusher; the third size, the oversize rejects, goes into the secondary crusher. This is a single roll crusher and the rock passing through it is carried by a 24-in. conveyor back to a 54-in. dia. by 24-in. corrugated double roll crusher which discharges on the first 36-in. conveyor, the rock again going through the scrubbing screen.

The log washers are in duplicate and are made of steel and are 25 ft. long. They discharge onto a 30-in. conveyor, which also receives the discharge from the double roll crusher, and carries both up to the sizing screens and bins.

There are three pair of sizing screens and four bins. The bins are "V" shaped, with the open end pointing towards the storage piles. Power drag scrapers of 2-yd. capacity are used to drag the rock from the bins out into storage piles. These scrapers can be reversed when it is desired to load from the storage piles.

The bins are erected over a concrete tunnel, each bin having a gate in the bottom of the bin (and top of the tunnel) through which the rock is run onto a 30-in. belt conveyor. This conveyor carries the rock out and up into the loading hopper. Here it passes through a rinsing screen and then on through the hopper into the railroad cars beneath.

The rock has four reductions, first going through the 30-in. dia. by 60-in. single roll primary crusher, then to the 24-in. dia. by 50-in. single roll secondary crusher. From there it goes to the 54-in. dia. by 24-in. double face roll crusher and finally finishes through the 48-in. dia. by 24-in. face double roll crusher.

The washing is done first in the scrubbing screens, then the log washers, then the sizing screens wash it. Finally, as the rock is loaded out it is given a rinsing. About 2500 gallons per minute of water are used in the cleansing.

The plant is operated throughout by electric power purchased from the Florida Power Corporation. It is delivered at 60,000

The quarry and 3-yd. electric shovel

Incline from the quarry to the primary crushing department

volts, but is stepped down to 440 volts, 3-phase. This relatively low voltage is used as a safety measure.

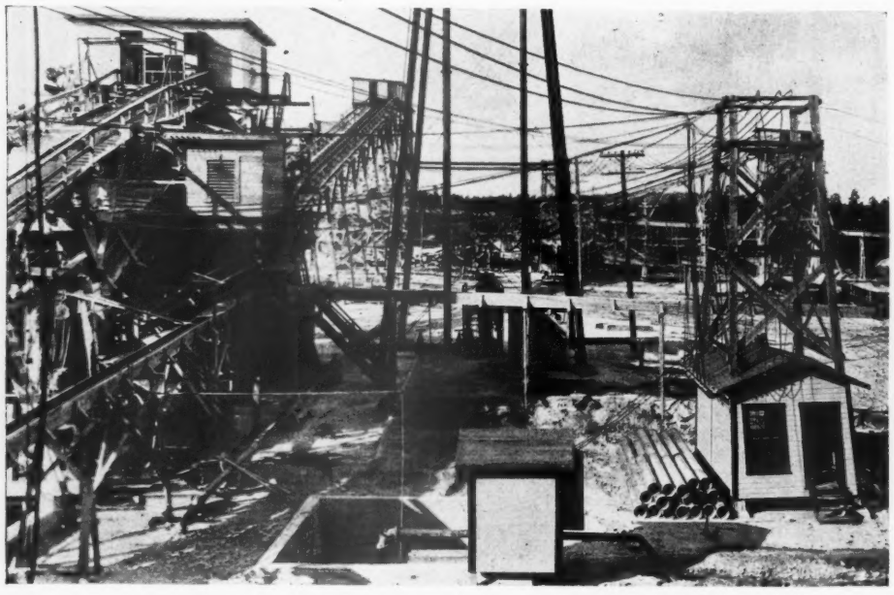
The water from the sizing and rinsing screens carries with it a considerable amount of fine rock passing a ¼-in. screen. This material is caught by a sand separator and dumped into a pile near the railroad track from which it is loaded out. These screenings are used in the manufacture of concrete blocks, pipe, and other cement products.

The waste water flows into a sludge pond, where most of the fine material is deposited, the water flowing out of this sludge pond carrying only very fine suspended lime and clay. The sludge pond covers about eight acres.

The water for the plant is obtained from a well 620 ft. deep. This well was started 22-in. dia. and finished 12-in. dia. A multivane centrifugal pump, the suction of which is 140 ft. deep, is used for pumping; its capacity, pumping against a total head of about 210 ft., is about 2800 gallons per minute.

The maximum capacity of the soft rock plant is about 1500 tons per day, and of the hard rock plant about the same amount of finished product loaded on to cars.

The main offices of the company are in Lakeland, Fla. Wm. P. McDonald is president and John E. Ballenger is vice-president and general manager.



The washing plant as seen from the primary crusher house

Types of Electric Detonators

PRACTICALLY all electric detonators now used in the United States are of the low-tension type, according to the Bureau of Mines, Department of Commerce. Those most used have a copper capsule, having fulminate of mercury as the main constituent of the detonating charge, and have a sulphur-composition plug to support the leading-in wires and the bridge wire. The present practice in the United States is to use only three strengths of detonators, namely, Nos. 6, 7 and 8. The relative strengths of these three sizes are shown by the weights of the detonating charge in each, which are as follows: No. 6, 1 gram; No. 7, 1½ grams, and No. 8, 2 grams. This difference in the amount of charge and the consequent difference in the length of that part of the copper capsule constitute the only difference between the three strengths of detonators of the same type. The same bridge-wire elements are used in each of the different sizes. Manufacturers usually pack their detonators in boxes having different-colored labels, each size of detonator having its special color, so that the size of the detonator may be known at a glance.

For firing shots at a considerable distance under water, special "submarine electric detonators" are sometimes used.

Recent Improvements at Edison Portland Cement Co's Plant

New Pack House and Important Changes in Quarry Layout

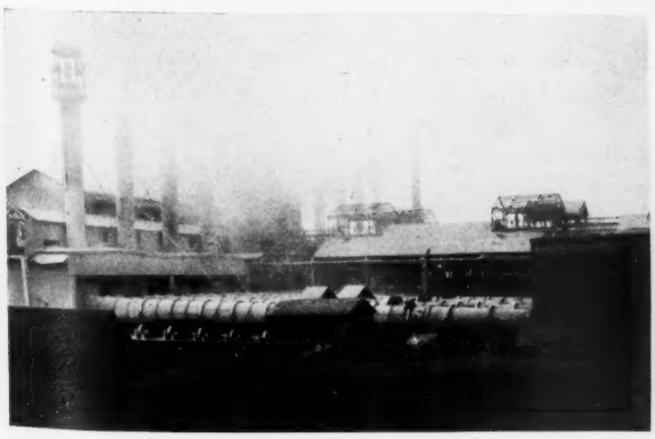
THE Edison Portland Cement Co., originally one of Thomas A. Edison's many enterprises, operates a plant at New Village, N. J., which is among the oldest cement mills in the United States. It began production almost with the beginning of the century. Cement making was unstandardized at that time and much of the machinery in the plant was designed by Mr. Edison himself to meet the conditions of cement making as he saw them. And he did so good a job that some of the machines, such as the "giant" rolls and the rolls which follow them, are in use today because it has not been found economical to displace them with more modern machines.

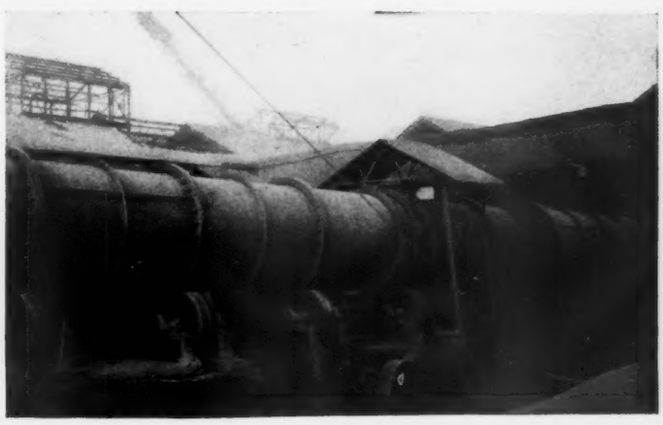
At the time when the construction of this plant was begun, in 1898, it is said that there were only six cement producers in the United States, the Coplay, Vulcanite, Atlas, Alpha, Lawrence and Nazareth companies, all of which have grown to immense producing organizations. Mr. Edison's fame as an inventor was then at its height and everything he did or said was good newspaper copy. He foresaw the possibilities of portland cement concrete in a way that few men did—even architects and engineers—and experimented with it and promised the world great things to come from concrete construction. A spectacular bit of advertising was the pouring of a monolithic concrete cottage in a single day. Much of what Mr. Edison prophesied for concrete construction has come true, even that part of his prophecy which was ridiculed at the time. The cement industry owes him more than a little for his publicity in behalf of cement at a time when that publicity was most effective.

Mr. Edison's great contribution to the manufacture of portland cement was the long kiln. The rotary kiln had already been introduced by Alfonso de Navarro but Mr. Edison increased its length from 60 to 150 ft. Some authorities claim that the long kiln was the greatest improvement made in cement manufacture, as it allowed a better product to be made at a lower cost. The construction of such kilns was difficult in those days and they had to be made in many small sections and supported at many points.

The Edison plant is among the larger producers of the country, its output averaging 200,000 bbl. per month. It uses the dry process and the buildings are spread over a much larger area than they would

Looking down into the Edison quarry at New Village, New Jersey





The long kilns were Mr. Edison's contribution to the cement industry. These pictures show some of the original type which are still in use

be if the plant were to be built today. Connection with the various departments is by belt conveyors, some of which are unusually long. Naturally many changes have been made both in the plant itself and the methods of working. Some of these improvements are quite recent and it is these which will be described more fully in this story.

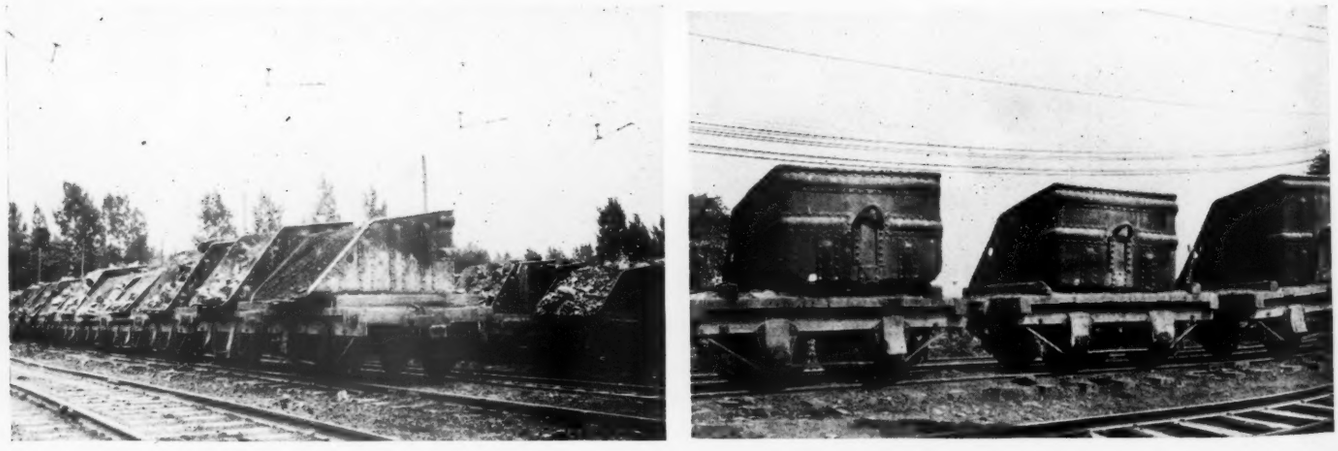
One of the most important improvements is at the quarry. Originally the quarry cars were brought around to the crushing plant by a long road that wound through the hills. The distance that had to be traveled was two or three times the quarter of a mile or so that separates the quarry from the plant. This was shortened somewhat so that the cars could be brought up to a "high line" loading directly to the plant and now the method is being made still more direct by putting in an incline which will lead from the quarry floor to storage tracks from which the cars are pulled into the plant by an electric locomotive. The storage tracks and the steel bridge connecting them with the plant are now complete although the work on the bridge was only begun last January. The electric locomotive pulls in all the cars, both of cement rock and limestone. The hoist for the incline has been installed and is used to pull the cars of dirt from the excavation where the incline is being made. There is a great deal of earth and rock to be removed, however, before the incline will reach the floor of the quarry.

New incline being cut to the quarry to reduce the long haul from quarry to mill

The quarry has been worked in benches and is down a considerable distance from the surface. Just how far it would be difficult to estimate as the ground is rolling. But at the point from which the picture of the quarry is taken it is 150 to 200 ft. to the floor. The hole that is worked now is elliptical, about 1100 ft. on the long axis and 900 ft. on the short axis. The face is about 60 ft. high. Drilling and blasting follows the usual practice of the district and the holes are put down with a Keystone drill. Another drill of this make was just starting in on new work when the quarry was visited.

All the ground has been diamond drilled and the reserves of cement rock calculated. In doing this, and the geological work in connection, a discovery was made which is of the greatest importance to the company's future operations. Limestone was discovered underneath, or behind, the cement rock of the same quality that is quarried at Oxford. This is being developed so that in a short

Electric haulage is one of the recent improvements



Two views of the peculiar type of quarry car used at this operation

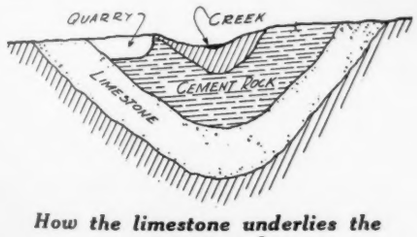
time the company will produce all its material from a single quarry. The cement rock has been worked back to expose the hanging wall of limestone where it will be cut through by the new incline and this is shown in one of the pictures.

The diamond drilling was done by contract with Sprague and Henwood, who are said to have nearly 150 machines engaged in prospecting work in the Lehigh Valley and vicinity at the present time.

The train shown above the quarry (left) is taking the long route to the mill that the new incline will cut off

The cement rock is loaded by two steam shovels, a Bucyrus 95-B, which is a veteran with 22 years of service to its credit, and a Marion No. 37 more recently installed. Cars are pulled in and out of the quarry by steam dinkies. The track system has two main tracks which follow around the face of the quarry, one for pulling in empties and the other for pulling out loads with cross-over connections. Recently portable tracks made by the Easton Car and Construction Co. have been laid in this quarry.

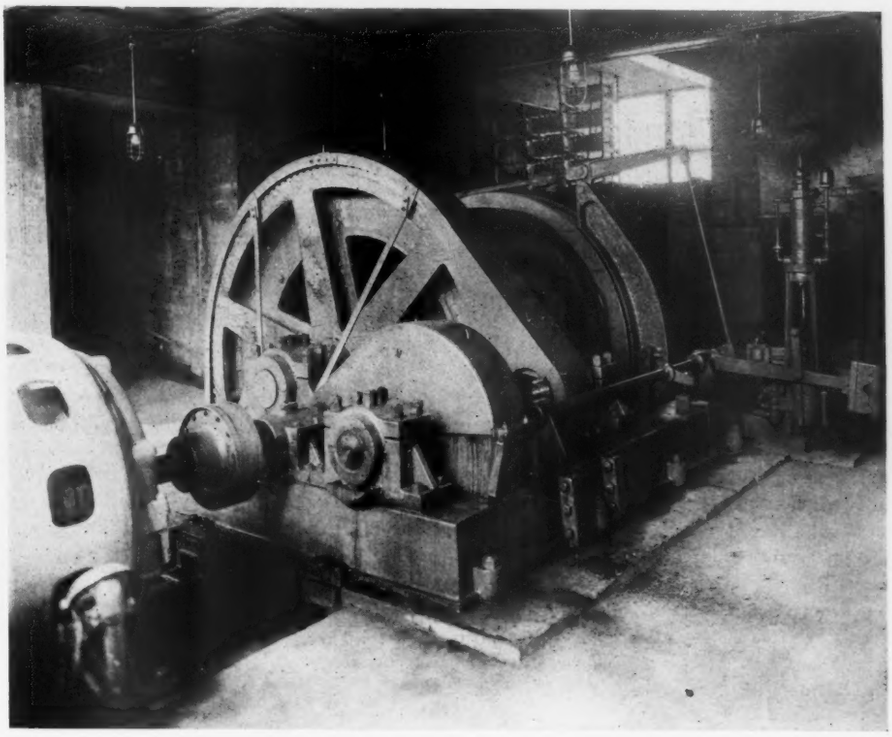
The cars are only flat top trucks on which rest the skips adapted to the peculiar system of car dumping which was one of Mr. Edison's inventions. The skips are like big flat-bottomed scoops with a loop at the back where the handle of a scoop would be. When the car is to be dumped at the plant a man places a long hook, attached to a hoisting rope, in this loop. The pull of



How the limestone underlies the cement rock

the hoists first draws the skip forward on the car and then pours its contents into the hopper of the giant rolls which are the primary crusher. When the hoist is released a weight on the other end of the rope pulls the skip back on the car. The weight strikes the ground at the end of its run, slackening the rope so that the hook may be removed from the loop. It is a simple and ingenious device and C. B. English, the former manager of the company, says that he has seen nothing for which he would care to change it.

The hoist by which the quarry cars will eventually be drawn up the incline is installed in a concrete house under the tracks from the quarry to the plant. Everything about this hoist installation is unusually well done, the concrete house with its iron doors, the arrangement of the machinery and switchboard and the piping which is largely buried in the concrete. The pipes for the air brake and the wires for starting and stopping the hoist motor are led to a concrete tower at the top of the incline so that the operator can see down into the quarry and back along the tracks to the plant. This tower is about 80 ft. away from the hoist and 30 ft. above it.



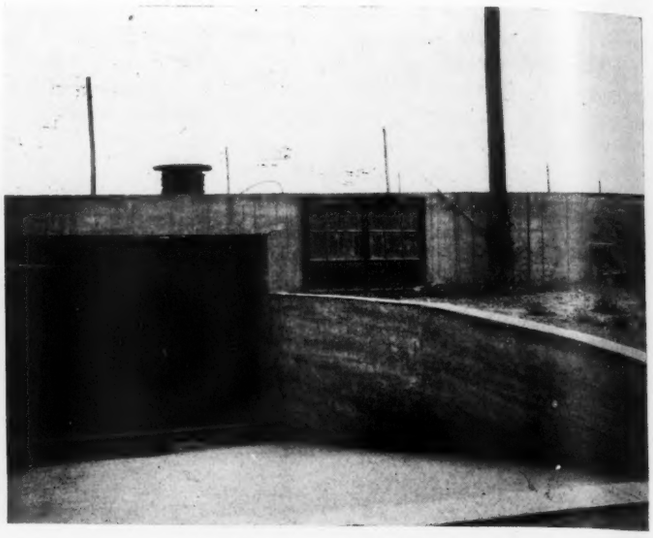
Remote control hoist at the head of the new incline

The hoist was made for this installation by the S. Flory Manufacturing Co. and it has a drum 8 ft. in diameter and 5 ft. 6 in. long. The rope speed is 600 ft. per minute at which speed the draft is 20,000 lb. It is driven by a Westinghouse 200 hp. slip ring motor controlled through Westinghouse automatic contactors, the current being delivered at 2300 v. The motor shaft has a pinion on one end which drives the drum through two herringbone gear reductions and their action is very smooth running and almost silent.

There are two brakes on this hoist, one the regular air brake for the drum and the other an independent brake for the pinion and motor shaft which protects the gears. Without this brake the gears would be subject to the strain set up by the inertia of the motor and pinion every time the hoist was stopped. The brake for the drum and the brake for the pinion shaft are worked from the same air valve so that they always act at the same time and at the same speed.

The air brake is of the type which holds the brake shoes tight to the drum by a counterweight and the drum cannot be released to hoist a load until the weight is lifted by a compressed air cylinder. The valve in the tower by which the brake is released has five settings so that the brake may be thrown on slowly or quickly as desired. Air for operating this brake comes from a small Allis-Chalmers motor compressor set placed in the hoist house. A Trumball safety switch governs the starting and stopping of the compressor by the

Hoist house and tower from which the hoisting is controlled



Close-up of the hoist house which is below the tracks

air pressure available for braking.

The hoist is provided with a "limit switch" which automatically throws off the power and applies the brake at the top of the incline. This prevents any danger of accident from "overwinding."

The cars of dirt which are drawn up the incline by this hoist are pulled out on a dump which is being built beside the plant tracks. An 8-ton Vulcan gasoline-driven locomotive does this work.

The electric locomotive which pulls in the cars of cement rock and limestone is especially interesting because of the remarkably low cost of operation. It was made by the General Electric Co. and it has the same pantagraph connection that is used with electric locomotives of the largest type. The motor uses direct current at 500 volts and the speed is 6.8 miles per hour. It has an effective drawbar pull of 10,000 lb. However, the cost for current would be low if electricity had to be purchased for the price to large users in the Valley is reported to be about 1.25 c. per kw.-hr.

A number of the motors in this plant use direct current. They are supplied by three synchronous converters in the power house which together have a capacity of 3500 kwh. Alternating current is supplied by a General Electric turbo-generator set, the steam for which is generated in waste heat boilers. This installation has been made in recent years and the original plant, which has reciprocating engines and generators of the fly wheel type, is held in reserve.

The stone storage referred to above occupies a building which is 650 ft. long and 50 ft. wide. A considerable part was built in the past year. It is filled with crushed rock and limestone which has passed the "giant" rolls and three sets of rolls in series so that it is reduced to about inch size and finer. The interior of the stone storage is divided into nine bins and limestone and cement rock are kept separate in these bins.

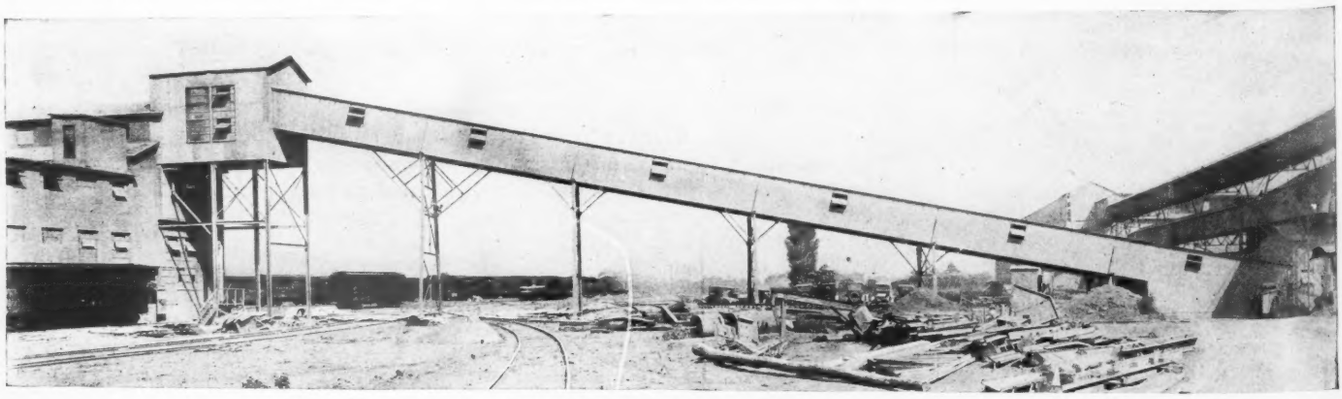
Formerly the stone was dried before being put into storage but drying has been discontinued and the stone is by-passed around the dryer. In the case of much bad weather or snow and ice in the quarry drying could be resumed if necessary to prevent the stone from freezing in storage.

At the top of the storage house is a gallery running the full length in which there are two belts, one for cement rock and one for limestone. Similar belts in a tunnel in the bottom permit the recovery of the stone through gates in the bottoms of the bins. All these belts are 24 in. wide and about 750 ft. long, center to center. They pass through the side of the storage house to the sampler, which is in a separate building.

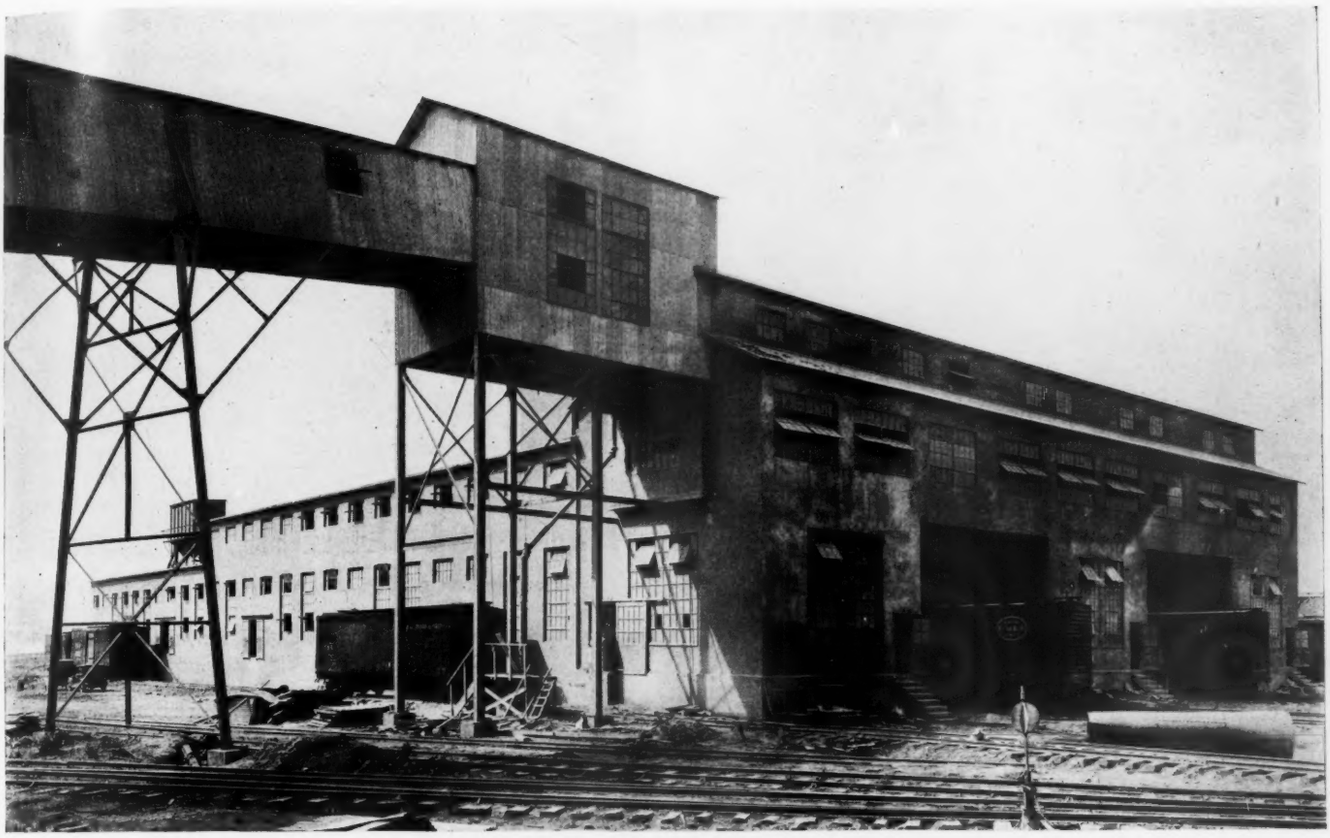
The sampling of the streams of rock and limestone is entirely automatic, a cut being made by an arm which revolves about a shaft and passes the cutter through the stream every five minutes. The large sample taken in this way goes to a small hammer mill which breaks it to a fine size. After crushing the sample is sent through a series of cutters so that the final sample, which represents a day's run, may be contained in a single sack. After being sampled the rock and limestone are sent to bins in the weighing house by a series of conveyors.

Such a method of sampling has been proved to give an accurate knowledge of the lime, silica and alumina content of the stone from which the proper proportions for the mix may be worked or read from tables. The proportioning for the actual mix is done in the most accurate manner by weighing each constituent in a weigh hopper from which the two flow into a mixing bin. From the mixing bin they are dried and sent to the Allis-Chalmers tube mills and the product of these then goes to raw rock storage or to the kilns.

The packhouse of the Edison Portland Cement Co. was constructed in 1926 and had been in use about six months when the notes for this were made. It is thoroughly



This gallery has three 400-ft. conveyors that take cement from the screen house (extreme right) to the pack house

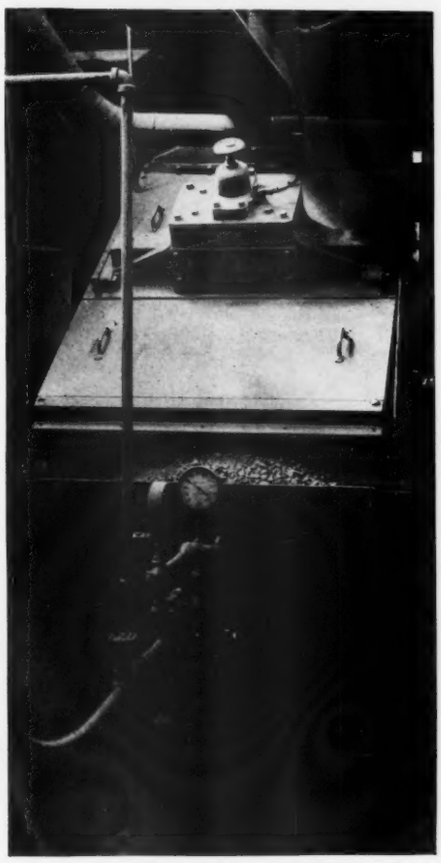


The new pack house. The packing machines are in the bays, each bay being between two loading tracks

modern in design and equipment in that it has an excellent dust-collecting system and good arrangements for handling and cleaning sacks. But in bringing the cement from the stockhouse to the packhouse consideration had to be paid to the storage facilities which were already in place. These are stockhouses built before the present fashion of storing cement in silos was developed. The stockhouses are fitted to use with conveyor systems and for this reason and from the fact that considerable horizontal distances had to be traversed it was judged that belt conveyors were better adapted to the work than the pneumatic pumps that are coming so generally into use for moving cement. The horsepower required for conveying is considerably less than that which it was calculated would be needed for pumping.

The combined storage in the stockhouses is 490,000 bbl., or nearly two and a half months' output of the plant. The Edison company was one of the first to appreciate the value of the ample storage capacity which all cement companies are now installing. The stockhouses are splendidly built of reinforced concrete and each has a number of screw conveyors in the bottom which draw out the cement to a common conveyor running lengthwise of the house. From these the cement is conveyed by belts to the screen house.

All the belts are 36 in. wide and where necessary are supported on steel structures. Mellin idlers with ball or roller bearings are



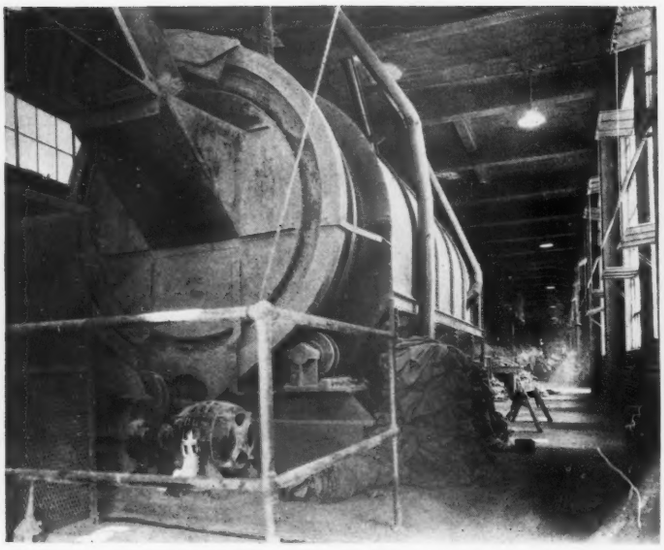
Screen and pneumatic pump under sack cleaner

used throughout for the troughing idlers. They were made by the Hydraulic Pressed Steel Co. The return idlers were made by the Variety Iron Works, and have either ball bearings or roller bearings. Belts are of various makes. The lengths of these conveyors vary according to the distances from 250 ft. to 1000 ft. centers. The three belts which lead from the screen house to the packhouse in the inclined gallery connecting the two are of 400 ft. centers. This gallery is of structural steel covered with New Jersey corrugated zinc sheets. The Alemite lubrication system is used throughout.

The screen house to which the belts from the stockhouses go contains three "Hummer" screens and their purpose is to insure that no foreign material such as a bolt or nut, dropped in by accident or shaken loose from some of the machinery, gets into the cement.

From the screens the three 400-ft. belts in the gallery take the cement to the third (top) floor of the packhouse. Each of the three belts discharges to a screw conveyor which runs the full length of the house over the packing bins, about 120 ft. in all. There are twelve packing bins and each has a pipe leading from each screw conveyor with a gate so that each bin may be filled from any or all of the conveyors as desired. The screws are about 16 in. in diameter.

The Bates packers are arranged in three stations with four machines in each station —12 machines in all. The switchboard with the controls for the four packers is in the



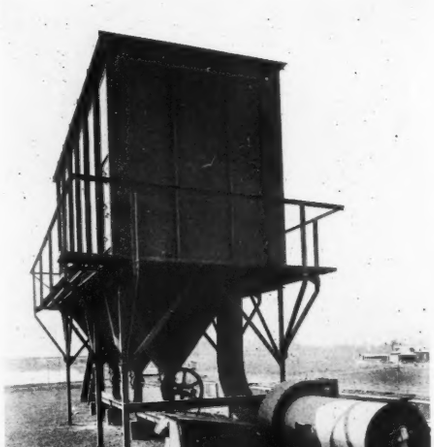
Rotary sack cleaner in new pack house

Sorting and repairing sacks in new pack house

center of the station. The packers are set in pairs so that each pair delivers on a short belt which runs to a door at the side. This door opens into the railroad car that is to be filled. As two cars may be loaded from each station, six cars may be loaded at the same time and there is a spout at one side of the building from which bulk cement may be loaded into a seventh car. Hence the facilities for handling large deliveries promptly are unusually good.

The track system to accommodate so many cars makes a fair-sized railroad yard and there is room in it to hold 125 cars above the packhouse and 78 cars below it. All the cars are run through the plant by gravity.

Sacks are cleaned, repaired and tied in bundles for reuse in a sackhouse which forms an L with the packhouse. The building is 140 ft. long and 28 ft. wide inside. At the end where the sacks enter is a bag cleaner made by the Nazareth Foundry and Machine Co. which contains a screen cylinder 27 ft. long and 8 ft. in diameter. The cement shaken from the bags falls into a hopper below this cylinder and a screen conveyor in the bottom takes the collected cement to a "Hum-mer" screen. This removes all lumps of cement and any foreign material that may have been gathered by the sacks as they were returned to the plant. The undersize of the screen—clean cement—is sent to the packing bins by a 4-in. Fuller-Kinyon pump. The dust which is raised by cleaning the sacks is drawn by an American Blower fan to a Sly dust collector which is placed on the roof of the bag house. This dust is piped back to the Fuller-Kinyon pump and sent to the packing bins.



Dust collector on roof of pack house

The system of cleaning and handling the sacks is so good that there is no dust whatever in the stackhouse. In fact there is no dust to speak of in any part of the packing plant except what may blow in through the

Looking down on bag packing machines from second floor of pack house

Upper floor of pack house showing screw conveyors and dust collectors

doors and windows. Beside the dust collector for the bag cleaner there are three others above the Bates machines which receive all the dust made in packing. These are set on the top floor of the plant above the packing bins and each is connected with a type E American Blower fan. The dust collected falls into the packing bins.

The construction of the packhouse is of reinforced concrete all through—walls, floors and ceilings. The roofs are flat and covered with tar and pulverized slag. Ample windows are provided so that there is good light everywhere. A large elevator serves all the floors.

This excellent construction was noted everywhere in the installation and some of the details are interesting. Beginning with the conveyors that bring the cement from the screen house to the packing plant, these have Mellin idlers with Hyatt roller bearings above and Variety idlers with Timken roller bearings below. The idlers are set unusually close, 4 ft. apart above and 8 ft. apart below. These belts are driven by 50-hp. motors through worm gears made by the Philadelphia Gear Co. On some of the other belts the drive is through Falk Bros. herringbone gear reducers.

The screw conveyors that take the cement from these belts and distribute it in the packing bins are driven by a 50-hp. motor through a Falk speed reducer.

The dust collector fans are direct-connected to a 30-hp. motor which runs at 1200 r.p.m.

The Bates valve rag packers are driven by a 20-hp. motor and a 5-hp. motor drives the conveying belt under these machines. These motors run at 720 r.p.m.

A 7½-hp. motor drives the 4-in. Fuller-Kinyon pump under the bag-cleaning machine and it runs at 900 r.p.m. In connection with this sack-cleaning machine is a sack elevator and feeder which is driven by a 5-hp. motor running at 720 r.p.m. The bag cleaner itself is run by a 30-hp. motor through a Philadelphia worm gear and the same motor drives a belt which brings out the cleaned sacks through a chain and sprocket and a Philadelphia worm gear.

All the motors in the packhouse are of the Fairbanks-Morse ball-bearing type.

Argentine Portland Cement Industry

THE use of portland cement has greatly increased in Argentina during the past five years. Both imports and domestic production have shown progress each year. The country now has three plants manufacturing cement, while receipts of foreign cement have gradually increased from approximately 163,000 metric tons in 1921 to 371,000 in 1925, and according to an unofficial estimate 186,520 during the first six months of 1926. Belgium has consistently held the lead in supplying the Argentine market for portland cement. Germany, Denmark and Norway also furnish substantial amounts. Receipts from the United States, however, always have been negligible.

Although the United States has only a small share of the importation, the manufacture of cement in Argentina by an American company is probably the outstanding factor in the cement trade of the country. This company is the most important of the three plants operating in Argentina and has an annual capacity of 735,000 bbl., compared with 70,000 and 35,000, respectively, from the two other concerns. The entire consumption of portland cement in Argentina in 1924 approximated 413,000 metric tons, of which 138,715 tons, practically one-third, were manufactured locally, 128,715 by the American company. In 1925 the domestic manufacturers supplied only about one-fourth of a total consumption of 500,000 tons, 119,000 being furnished by the American company. The total production of the domestic industry for 1926 is scheduled at approximately 165,000 tons, the highest on record, but no figures have been issued for the probable imports. For the first half of the year, however, consumption has been estimated at 268,135 tons—81,615 of Argentine manufacture and 76,615 from the American company. On the whole it would appear that approximately 70% of the cement used in Argentina is imported and 30% manufactured in the country.

Portland cement destined for use by departments of the Argentine government must be previously sanctioned or "approved" officially by the sanitation department (Obras Sanitarias). Temporary approval may be obtained after samples of two shipments have been made. There are about 21 makes of officially approved cement regularly advertised in the Argentine market, most of them imported brands. There are also many other brands not officially approved and others having "temporary" approval which are advertised and sold in the country.

Present prices of cement are rather low, due to heavy imports and the existence of large stocks, and Argentine importers are placing few orders. The prices of the 21 brands of officially approved imported cement in 1926 ranged from 8.50 to 11.90 paper pesos per barrel of 170 kilos net (about $3.40 to $4.75 per bbl. of 376 lb. net) delivered. Quotations on cement not approved were a few cents lower than those officially sanctioned. The greater part of the imported cement is brought in through Buenos Aires, which received 243,147 tons of the 1925 importation and 145,018 of that received during the first half of 1926.

Prices of cement manufactured locally (approved or otherwise) were quoted at 2.90 paper pesos per sack of 50 kilos, or 8.67 pesos per bbl. of 180 kilos gross on board freight cars at Buenos Aires ($1.15 per 110-lb. sack, or $3.47 per bbl.) Prices of the domestic cement delivered within the central part of Buenos Aires were 3.05 pesos per sack, or 9.18 pesos per bbl. (about $1.22 and $3.67, respectively). Delivered prices for greater distances were slightly higher. There is little difference in price between the imported and the domestic cement. Due to high freight rates on inland transportation the domestic industry cannot compete in price with the imported cement at such ports as Rosario and Santa Fe, although the proximity of the local American cement factory to Bahia Blanca gives this company a lead over the imported brands.

The import duty on portland cement, including the customs surtaxes, amounts to 32% of a fixed valuation of 1.76 pesos per 100 gross kilos, plus 0.003% for statistical taxes and slight handling levies amounting to about 15 centavos gold ($0.665) per quantity of 220 gross pounds. These charges include all costs of placing the imported cement on board freight cars, trucks or wagons at Buenos Aires, Rosairo, Bahia Blanca or other Argentine ports.—*Assistant Trade Commissioner S. H. Avery, Buenos Aires,* in U. S. Commerce Reports.

Editor's note: The American plant referred to is undoubtedly the Cia Argentina de Cemento Portland, a subsidiary of the International Cement Corp., New York.

Portland Cement Association Issues Attractive Booklet

"SEEING CONCRETE AMERICA," a 34-page pamphlet, has just been brought out by the Portland Cement Association, Chicago, Ill. It contains over 100 illustrations showing the use to which concrete has been put in the construction of beautiful buildings and highways and ornamental art effects in the United States. There are also several pictures on the manufacture of portland cement, with a brief discussion of the advancement made in its manufacture since the time of its invention by Joseph Aspdin in 1824.

Factors Affecting the Safety of Explosives

TO the end that yet safer explosives and blasting methods may be developed, the Bureau of Mines, Department of Commerce, is investigating the factors which affect the liability of an explosive to cause ignition of gas or coal dust. The effect of chemical composition, physical characteristics and explosive properties of the explosives themselves, as well as the methods of loading them in the borehole, are being investigated in a testing gallery from this point of view. It has been shown that for explosives of identical chemical composition, those having higher rates of detonation are more likely to ignite gas. Wet fireclay stemming or fine rock dust stemming are safer than dry fireclay. Coal dust stemming has been shown to be more dangerous than no stemming at all. The relation between limit charge and gas concentration has been studied and the lower limit of inflammability of natural gas to ignition by explosives has been determined.

Progress in Scientific Control of Lime Manufacture*

A Resume of Some of the More Important Investigations Carried Out Recently

ALTHOUGH lime was probably produced at a few places for local consumption much earlier, it was not until about 1733 that the manufacture of lime began to be established as a real industry in this country. In that year lime was shipped in sailing vessels from Rockland, Maine, to the Boston market and almost a hundred years later, in 1823, lime was first shipped to New York where it sold for $2.00 per cask. This lime was all produced in so-called field kilns,the forerunner of the pot kiln. Since then there has been considerable progress in kiln design and methods of burning but this development has been most rapid within the last ten or fifteen years, and the modern shaft and rotary kilns of today represent a design and procedure entirely different from the old field kilns.

The hydration of lime is a relatively recent development, the commercial production of this material having been started about 1904, and probably greater progress has been made in this than in any other branch of the industry.

As in the cases of other old industries, the injection of technical control and the application of scientific information has been slow in the lime industry and, as pointed out by Knibbs, as compared with other processes of equal importance, lime manufacture has been more or less neglected by technical writers and investigators. In fact progress in connection with the uses of lime in all fields has been rather greater than in the manufacture of the material. The rapid strides in the industry in the last two or three years however are quite gratifying and indicate the focusing of the attention of a number of investigators on the various problems. A few of these more recent accomplishments can be mentioned as outstanding.

Quarrying Studies

In quarrying a large amount of careful consideration has been given the proper and complete removal of overburden and consequent prevention of contamination of the stone. Such activities have in a number of cases led to the adoption of tunneling or mining methods as the most practical solution. A large number of companies have made systematic surveys and studies of the stone available and deposits have been completely mapped on the basis of physical properties, chemical analyses and geological characteristics.[1] This has made possible and has resulted in the exercise of selection and classification of the stone for burning for the various uses.

Much attention has been given to blasting operations and to the adaption of explosives and methods of shooting to increase efficiency and to produce the maximun proportion of stone of the desired size with a minimun of fines. Several engineers have made intensive investigations of crushing problems[2] and the utilization of the principles developed, particularly in the production of the finer grades of stone and pulverized lime, has meant economy.

Kiln Investigations

In burning the greatest progress has probably been in the study of fuel efficiencies and the more strict supervision of the kiln operation. The investigations of Azbe in this field are outstanding and have included kiln design and kiln refractories, firing and drawing practice, control and regulation of air supply,[4] decomposition temperatures,[5] effect of steam in calcination,[6] and the operation of and use of kiln gases in gas producers.[7] Where recommendations resulting from these investigations have been put in practice noteworthy improvements in both operation and product have been obtained and this is especially true where closer supervision and control of air supplies and of the drawing and firing routine have been inaugurated. Conclusive proof seems to have been produced that the specific beneficial effects claimed for steam in lowering decomposition temperatures and otherwise improving calcination have been more or less imaginary or that the same or better results can be obtained by the use of cheaper inert gases such as CO_2, or kiln gases.

Considerable study has been directed by a number of manufacturers to the use of oil and gas as fuels and decided improvements have been made in burner design. Proper and effective mixing of gas and air to obtain a longer flame and to prevent localization of the decomposition zone around the sides of the kilns seems to have been satisfactorily accomplished. The substitution of kiln gas, at least partially, for steam in producers,[8] and the more careful control of temperatures in producers, have been effected in several plants with consequent improved fuel efficiencies.

Research on Calcination

The investigation by Haslam and Hermann[9] of the effects of time and temperature of burning on the properties of lime is an important contribution of the year to the technology of the process. Preliminary reports have also been made by Haslam of the study of the progress of decomposition in rotary kilns and of the rate of heat flow through limestone.[10] By the use of the data developed it should be possible to demonstrate the maximun capacity of kilns and to operate them more efficiently. The sizing of kiln stone is being more carefully controlled in a majority of plants with continuously improved uniformity of product and the problem of burning fines has been the subject of a very interesting investigation by the nonmetallic section of the Bureau of Mines in cooperation with an equipped manufacturer.[11]

The work of Mathers[12] which has demonstrated the effects of addition of certain salts such a sodium chloride to the stone being burned in modifying favorably the properties of the resulting lime promises to have a far-reaching application in those plants desiring to extend the range of usefulness of their products. The use of control tests such as rates of slaking and settling, volume of sludge, plasticity, etc., has been adopted by a large number of plants during the year and an increasing number of manufacturers are availing themselves of the service of industrial and testing laboratories for control work. One apparatus manufacturer reports the sale of 12 plasticimeters during the year.

In the hydration of lime remarkable progress is being made. Practically all of the standard commercial hydrators have recently been modified, some in respect to both to design and operation, and in certain instances entirely new principles have been applied and the procedure almost entirely changed.

Hydration of Limes

Such work as that of Haslam[13] on effects of conditions of burning on hydration characteristics and that of Whitman[14] on the relation of conditions of hydration to properties of hydrates point out important fundamental principles which must be recognized in hydrator operation. More emphasis is being placed on the desirability of complete mixing of water and lime before hydration progresses far and along with this is noted the tendency toward finer grinding of the

*Contributed.

quicklime to be hydrated. There is a demand for equipment which will automatically separate completely from incompletely hydrated material during the course of the reaction and attempts are being made to provide this.[15] The grinding and air separation of hydrate is being studied quite intensively and the relation of particle size of hydrate to the manner in which it functions in its various uses is receiving considerable attention.

There is a tendency to increased fineness among chemical hydrates and recent analyses have shown some of these to contain as much as 96% of material finer then 20 microns (860 mesh) and 87% finer than 10 microns (1800 mesh).

There is perhaps no more interesting problem connected with lime manufacture than that of hydration and it is engaging the attention of a large number of scientists, engineers, operators and manufacturers. It is a fertile field and as a result of this interest we predict some startling if not revolutionary improvements in processes and products within the coming year.

It has been impossible in this short outline to mention more than these few greater strides which have been made in the industry within recent months, but these alone are sufficient to indicate the trend. The remarkable advances made in technology of the uses of lime have not been touched upon and these have all had important effects on production. There is no question but that the lime industry is at a turning point in its history and development. As indicated above, present methods are not at all standardized, but are being continuously and critically studied and other and probably more important changes are in prospect. At least 12 of the larger plants have recently employed chemists and a number are using the services of consulting engineers and specialists in all fields. The manufacturer is more clearly realizing the possibilities of his product and the opportunities for its development and the user is coming to a greater appreciation of the importance of lime as a raw material.

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Ohio Crushed Stone Association Makes Recommendations to Highway Department

AT the regular monthly meeting of the Ohio Crushed Stone Association at Columbus, January 6, the chief subject of discussion was the report of the specification committee, which is summarized in the following extracts from a letter to the Ohio State Highway Department:

1. This has to do with the application of bituminous materials in which we feel that perhaps it would be better to lessen the amount of bituminous materials in the first application and use a slightly larger gallonage in the seal coat and final seal coat. The figures in parenthesis are those now being used in your work.

GALLONS OF BITUMINOUS MATERIALS
(Item T-3, page 30)

Depth	First Application	Seal Coat	Final Seal Coat	Total
2½ in.	1.1 (1.5)	0.9 (0.7)	0.5 (0.3)	2.5
3 in.	1.5 (1.9)	1.0 (0.8)	0.5 (0.3)	3.0
3½ in.	1.75 (2.1)	1.25 (1.0)	0.5 (0.4)	3.5

Note: Where temperature is less than 50 deg. F. figures in parentheses are to be used.

2. That the stone in the top course of penetration macadam range in size from 2 in. to 3 in. or 3½ in.

3. That the stone in the water bound bases be of No. 1 or No. 1 and 2.

4. That the tonnage for penetration bituminous course be figured by using 0.05 tons per sq. yd. per in. in thickness of the finished road instead of 0.055 as is now the custom.

5. That serious consideration be given to the use of the insulating mat on unstable subgrades.

6. That consideration be given to any new cross-section for macadam construction which would tend to strengthen the pavement and give better results.

7. Permit us attention to the specifications for sand for fine aggregate for concrete which is found on page 90, item M-2—Specification for Fine Aggregate, Sec. 2. 1—Sand Grade A, reading as follows: Sand of this grade shall meet the following requirements:

"General: The sand shall be composed of clean, hard, durable, uncoated particles of stone, well graded from coarse to fine, with the coarse particles predominating, free from lumps of clay and all organic matter. This description shall not be interpreted as admitting the use of stone or slag screenings unless the use of same has been approved by the director in writing."

We believe that fine aggregate made from crushed stone or slag ought to be admitted in the above specifications providing of course, it meets the screening analysis and also physical properties as specified for fine aggregate. Therefore, if it is your opinion that all crushed stone or slag for fine aggregate can well be admitted in this specification we would suggest that the following be omitted from the above quoted specification. "This description shall not be interpreted as admitting the use of stone or slag screenings unless the use of same has been approved by the director in writing."

We wish to endorse most heartily the clause in the present specifications that provides for the use of a straight edge on macadam roads. The public demands now more than ever smooth surfaces and anything that is done by way of inspection and supervision to bring about such smooth surfaces we want to greatly encourage.

We wish also to endorse that clause in the specifications which provides for harrowing the coarse stone in each course of the macadam road before rolling. It is our belief that the harrowing is one good and necessary way to prepare the loose stone for the roller so that the unevenness will be minimized. It further tends to bring to the surface the larger stone in the course which contributes to better keying and binding together of the macadam.

Further permit us to offer this suggestion in the matter of inspection and construction of state roads. This is merely a suggestion of our part which we offer with the thought that it might be of some use. It is our belief that one chief inspector might be appointed for each division, this man to be thoroughly familiar with the construction of all types of road built by the state who have proven his ability as an inspector. Since his duties are confined entirely to the division, it seems to us that he would be able to visit each job under construction in his division at least twice a week and by so doing he would be able to keep a close line on the building of each particular job and be in excellent position to advise closely with the inspector who is on the job at all times.

It is further our belief that he would be able to make some very good inspectors out of men who are now incompetent on account of lack of experience and knowledge which is gained through consultation with one who has thorough experience with every type of construction of roads built by the state. It seems to us that the state could select one good chief inspector for each division from the men who had done inspecting for the state then through his efforts build up a very competent corps of inspectors in each division and over the state in general.

We realize the matter of inspection is a very perplexing one to the highway department and trust that our suggestion will be of some assistance in the matter of getting better inspectors throughout the state on state highway work.

Committee:

(Signed) H. M. Sharp,
Russell Rarey,
Carl L. Van Vooris.

Synthetic Gypsum—Its Recovery and Use*

Discussion of Problems in Utilization and Description of Operations of Commercially Successful Block Plant

By Robert S. Edwards

THE most common sources of synthetic gypsum as a waste by-product are in the chemical processes wherein lime salts are acted upon by sulphuric acid. By-product gypsum falls into two general classes, (1) in which lime salts or minerals are treated with sulphuric acid to produce other acids, as, for example, in the production of phosphoric acid from rock or bone phosphate, and (2) processes in which free sulphuric acid is neutralized with some form of lime salt. Both classes produce a residual precipitated hydrous or hemi-hydrous gypsum. It has been estimated that there are being produced over 400,000 tons of by-product gypsum each year which largely goes to waste. About 85% of this is produced in making phosphoric acid and is not only an expense but a problem, particularly where dumping spaces are limited.

Problems of the Conversion Process

The conversion problem of waste from phosphoric acid manufacture appears to have been satisfactorily solved. Over two years of research were devoted and the first work carried on in a small experimental plant, then in a larger semi-commercial plant. These plants were the forerunners of a larger operation begun in January, 1925, and which produced successfully gypsum plaster and block of marketable grade.

In the study made on artificial gypsum it was found that many crystalline or non-crystalline substances when present either in the uncalcined retarders or finished plaster entirely upset the hydration of plaster. The ordinary retarders added to commercial plasters are either of animal or vegetable colloids and retard the crystallization in a regular manner. Reduced strength results, but the amounts of retarder added are too small to materially affect the strength. Further study revealed that when certain soluble salts contaminate plaster or gypsum from which plaster is calcined, not only is the set greatly retarded but the strength of the dried plaster is almost entirely gone. The worst of these contaminators is phosphoric acid, which is always present in more or less degree in the gypsum.

The next difficulty that arose was in densifying or compacting the synthetic gypsum before calcining into plaster. It is a well known fact that the denser gypsums yield plaster of greater strengths, because the setting crystal form is stronger. Synthetic gypsum because of the manner in which it is made forms a lighter, porous and less strong plaster than that made from rock gypsum. Further, the method of treating rock gypsum tends to densify it, the ordinary commercial plaster being crushed, dried, ground and pulverized before calcining. Further grinding in order to make it more dense is sometimes given in tube mills.

Treatment of Waste Synthetic Gypsum

The process for treating the waste synthetic gypsum and converting it in a standardized marketable product has been worked out and consists of six definite steps:

1. Pumping the precipitated gypsum in slurry form into Dorr thickeners, which are used as storage for raw material supply.
2. Partial dewatering and washing of the gypsum slurry by passing over a continuous rotary filter.
3. Repulping the filter cake and neutralizing the phosphoric acid contained therein by stirring in agitators.
4. Dewatering and densifying the gypsum magma by centrifuging.
5. Calcining the semi-dried, purified and densified gypsum into stucco or plaster of paris.
6. Converting this stucco or plaster of paris into neat plaster mixtures sanded plaster mixtures, plaster blocks or plaster board.

Washing alone does not take out the small amounts of free or partially combined phosphoric acid which is always present in waste gypsum, so neutralization with alkalies must be resorted to. This unless removed will appear in the calcined product and impart to it erratic setting and weakness. Although lime or lime hydrate is the cheapest neutralizer it has a detrimental effect on synthetic gypsums, weakening the plaster and greatly retarding the set. After experimentation it was found that the best neutralizers were the soluble sodium salts of carbonates or bicarbonates. The final product of these salts with the waste gypsum gave a material which had a brief staying set and rapid final set which was both stable and could be controlled and whose ultimate strength was not reduced.

Application of Process Steps

The calculated amount of salt is added to the gypsum magma in the repulper (step 3). The agitation brings about the desired neutralization and chemical change. The centrifuging or dewatering (step 4) causes a definite physical change in the form of the gypsum crystals. This is especially noticeable when gypsum having needle forms

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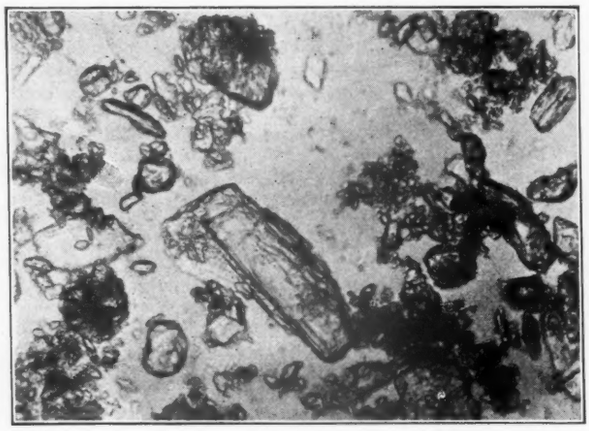
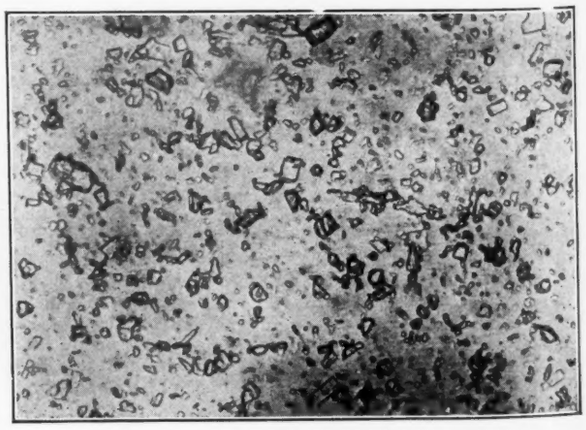
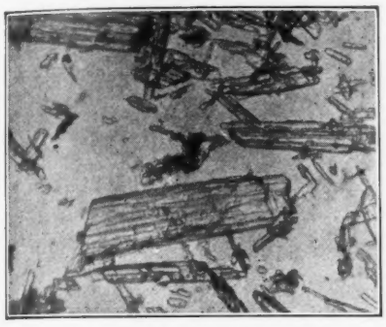


Rock gypsum from Nova Scotia (500x magnification)



Anhydrite from Centerville, Ia. (500x magnification)

of crystals is treated. Photomicrographs taken of the crystals before and after treatment show that the centrifugal force has actually brought about twinning or compacting of the individual gypsum crystals into large crystals or units. Later examination in the calcination showed that the plaster made from the centrifugal process was denser than that made by preliminary drying or dewatering in other ways. The tensile and compressive strengths of densified plaster from the centrifugal process showed in-

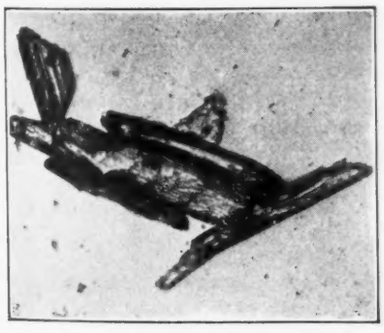


Synthetic gypsum from phosphoric acid manufacture—before densification

creases which amounted to 40% in the case of needle crystals and about 20% for the finer more granulated forms.

Calcination

Calcination of synthetic gypsum proceeds in a similar manner to that in use in ordinary commercial practice. The only difference lies in the state of the material as introduced into the kettle. Rock gypsum is generally ground so that 95% will pass through 100-mesh and because of the load the agitator requires a good deal of power. In some localities gypsite is calcined without previous drying and trouble sometimes occurs in the

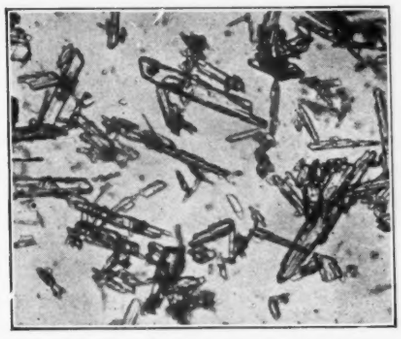


Synthetic gypsum after densification treatment showing compacting of crystals

kettle because of the material sticking to the sides and bottom. In calcining the synthetic product no unusual power is consumed nor is there any trouble with material sticking, although the moisture content is from 15% to 25%. The reasons advanced for this are: The material on discharge from the centrifuge is in an interstitially extended physical condition due to the shaving action of the discharging knife blade upon the compacted gypsum mass within the machine so that sticking of the kettle due to moisture is entirely eliminated and the material calcines in a regular kettle without side scrapers in three to four hours. The calcination is under control, recording thermometers being used to indicate the time and temperature at which each charge has boiled to the first settling point and drawing off.

Effect of Centrifuging on Physical Structure of Crystals

The centrifugal force action is great. At the plant a 60 in. basket is used at 550 r.p.m., giving a peripheral speed of 8000 ft. per min. Thus 1 lb. of gypsum exerts a centrifugal force of 245 lb. at the periphery of the basket. This force compacts the gypsum crystals while shaving action of the discharge knife against this mass in the machine tears them away and thus deliver them in interstitially extended form; in which condition free moisture content of the particles is so uniformly distributed that the discharged mass cannot again be compacted at any ordinary pressure. The charge in the kettle boils uniformly, top and bottom.



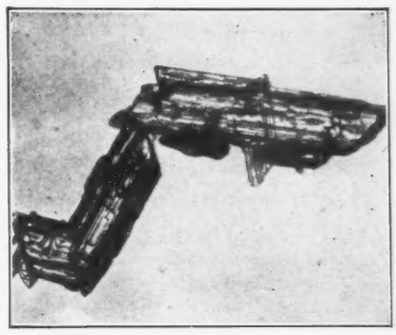
Synthetic gypsum from phosphoric acid manufacture—before densification

This proves the non-compacting physical condition under calcination. The small amount of heat necessary to drive off the water and calcine the gypsum demonstrates the free boiling nature of the material when prepared as above. These conclusions have been drawn from the treatment of several typical synthetic gypsums on a plant scale of about 20-ton lots. These gypsums were made from Tennessee, Florida and Kentucky rock and lime phosphate and also included two types of gypsum residue obtained from the neutralization of solutions containing sulfuric acid.

Comparative Plant Equipment and Cost Data

The ordinary gypsum plant producing 80 tons per 24-hr. day of plaster from rock gypsum 2 in. in size costs about $100,000, including equipment and bins. Figuring power consumed at 2 cents per kilowatt, fuel coal at $5.50 per ton, labor at 50 cents per hour, rock gypsum delivered at the plant at $1.50 per ton and an overall depreciation at 15% of the investment, it costs such a plant about $5.75 to produce a ton of stucco plaster. A 500-ton plant could cut this down to $5.18.

A plant using synthetic gypsum and of 80-ton per 24 hr. day capacity costs about $80,000 to build and equip and operating under the same labor, fuel and power conditions can produce the plaster at a cost of about $3.75 per ton. The following figures are taken from the actual operating cost data of a small plant producing from 15 to 20 tons of calcined stucco plaster per day of 12 hrs. and include the preliminary processing of the by-product gypsum from phosphoric acid manufacture.

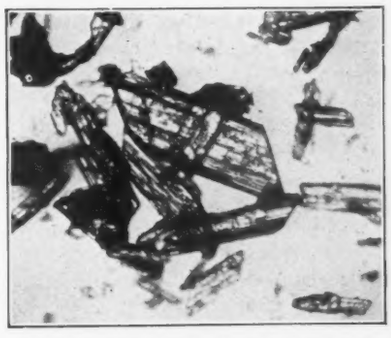


Synthetic gypsum after densification treatment, showing "twinning" action due to pressure

COST ANALYSIS

Precipitated gypsum	No cost
Labor (50c per hr.)	$17.55
Power (2c per kw.)	14.25
Fuel, oil (14 gal. per ton plaster), at $2.30 per bbl.	11.93
Supplies, chemicals, water, etc.	5.50
Repairs (labor and material)	4.00
Overhead (taxes, supervision, insurance, office heat and light, etc.	6.00
Depreciation (7% on plant cost, 2% on building cost)	7.50
Total cost of 15½ tons of plaster (stucco)	$66.73
Cost per ton	4.30

The greatest savings in manufacture is in



Synthetic gypsum from phosphoric acid manufacture—after densification

the preparation of the raw material. A plant using synthetic gypsum has no grinding to do; this item in the rock gypsum plant amounts to as much as $2.50 per ton. The chemical and mechanical treatment in the synthetic gypsum plant costs less than $1 per ton. Further, some of the costs of handling the gypsum waste from phosphoric acid works can be charged directly to them and this also cuts down handling costs.

This particular plant found it advisable to

use the gypsum made in the manufacture of blocks because the plaster was gray due to the presence of particles of finely divided carbon. The blocks sold at a price equal to that of the pure write, for plaster could be applied over them and color was no objection. Manufacture is carried out in the following manner:

The plaster is gaged with the required amount of water and the mass poured into 70 ft. rubber molding belts having a tongue and groove side. During the pouring they are reinforced along the entire length with shredded rattan fiber. The monolithic slab thus formed is run off and sawed into standard 30 in. block which are placed on cars and run through tunnel driers for curing. This type of reinforced block, it is said, has the following advantages:

1. Less breaking in handling, shipping and on the job.

2. Solid block of synthetic gypsum gives greater insulation than a hollow rock gypsum block; the strength is increased about 50% through reinforcement and the weight is about equal to a hollow rock gypsum block of the same dimensions.

3. Tongue and groove feature makes a stronger wall with better alignment and at a less cost for labor and mortar for erection.

4. Blocks can be laid without mortar, as this type of construction permits of nailing the block together.

The plant capacity is about 3600 sq. ft. of 2 and 3 in. block per 10 hr. day, manufactured at a cost of about 5 cents per sq. ft. (considering one-third of the output to be of 2 in. block and the remainder of 3 in.). These are said to be marketed in the New England states at from 9 to 12 cents per foot.

A. S. T. M. Committees Work on Rock Products

ONE of the outstanding accomplishments of American Society for Testing Materials' Committee C-1 on Cement during the year was the revision of the Standard Specifications and Tests for Portland Cement resulting in the adoption of new specifications. The principal changes involved are the elimination of the specific gravity requirements and the increase in the tensile strength requirements both at 7 and 28 days. The committee is looking into the possibility of substituting a new test for the present tensile strength test. This would consist in what is known as the fluid cement water mixture which would become the criterion of the concrete-making value of portland cement. Compression tests are made on neat cement mixes with about 40 to 50% of water by weight and poured into molds. This has received the study of the committee during the past few months and further tests of a co-operative nature will be carried out for the purpose of furnishing a basis for possible strength requirements.

Portland cement has received considerable intensive study. An extensive research program is being carried out at the U. S. Bureau of Standards under the fellowship established by the Portland Cement Association. The progress and significance of this program was brought out in a paper by R. H. Bogue entitled "Portland Cement Research."

Concrete is likewise receiving considerable attention, principally in connection with the problems attending the preparation of specifications for concrete. These problems were discussed in a paper by Cloyd M. Chapman. Committee C-9 on Concrete and Concrete Aggregates is at work on several of the phases involved, such as the formulation of satisfactory specifications for aggregates including a study of the weathering resistance of aggregate materials. Tests are being conducted to show the effect of freezing and thawing on concrete and an endeavor is being made to develop tests to eliminate aggregates that would produce unsound concrete.

A study is also being made on deleterious substances in concrete. This study includes an investigation on the use of dirty stone as coarse aggregate and the effect of sodium silicate on fluid neat cement pastes and on tests of mortars made with washed standard sand.

The possibility of using the transverse test as the standard for testing concrete is being investigated. Tension tests of concrete are also receiving the attention of the committee. A paper on this subject was presented in 1926 by A. N. Johnson. Other papers of interest are the paper by L. C. Stewart entitled "Effect of Calcium Chloride on Transverse Strength of Concrete Cured at Various Temperatures," and one by H. J. Gilkey entitled "The Autogenous Healing of Concrete and Mortars."

Lime and Gypsum

The work of Committee C-7 on Lime has been confined for the most part to a review of its specifications and methods of testing and in a study of plastering using various kinds of lime and aggregates. A number of test panels were erected at the U. S. Bureau of Standards and the condition of these has been reported upon. The committee feels that the question of plastering and the methods employed is a very important one and should receive further consideration in the committee.

Specifications for plasters, or for the gypsum entering into them, have been submitted by Committee C-11 on Gypsum. These are for gypsum molding plaster, gypsum pottery plaster and Keene's cement. The committee is continuing its investigation of the use of gypsum and anhydrite as a retarder in portland cement.

Slate and Building Stone

Committee D-16 on Slate is enlisting the support of producers of slate and of architects and engineers in its work. It has held its meetings in the slate-producing sections of the country and in connection with meetings of engineers. The committee is cooperating with the navy yard at Norfolk in making tests of the atmosphere for the determination of sulfur content with the idea of determining what action such conditions may have on various building materials.

The committee is planning to submit tentative methods of test for electrical slate. These will include not only methods of test in laboratories and shops but special methods for testing slate in the quarry and in the mill to determine that the slate is suitable for electrical insulation before it has been shipped or milled for that intended use.

A new committee, Committee D-18 on Natural Building Stone, was organized during the year. It has for its purpose the accomplishment of very important work that will be of considerable service to the architect and engineer. Its program includes the development of uniform nomenclature applying to the stone industry, the determination of chemical and physical properties as affecting the structural stability and weathering, effect of external agencies, standard methods of determining thermal properties and fatigue of stone, development of specification requirements, names and definitions for stone finishes, determination of structural integrity of stone after subjection to fire, preservation and maintenance of old stone structures and the resistance to abrasion under various conditions of use. As a first step existing data is being compiled.

Research

Committee E-9 has been obtaining opinions from various technical societies and from government bureaus concerning the advisability of a general investigation on the subject of mineral aggregates, covering their use in concrete, in ballast, in filter beds, etc. It would appear that there is considerable demand for such an investigation.

Addendum

AN item on the origin of diamond core drills, with particular reference to their use for the exploration of quarries, on page 37, ROCK PRODUCTS, February 5, failed to include the fact that diamond drills were developed by the engineers of the Sullivan Machinery Co., Chicago, as early as they were introduced into the United States from France by M. C. Bullock. In 1900, Mr. Bullock sold out his business to the Sullivan Machinery Co., which has continuously manufactured diamond drills since 1875. A recent catalog (No. 80) of the Sullivan Machinery Co., contains an interesting sketch of the development of the diamond drill, and some very interesting and helpful information for all who are interested in its use for exploring stone deposits.

Core-Drilling Lime and Gypsum Deposits

Methods Used to Prospect a Property for Future Operation

By B. A. Chappel
Manager, Southern Drilling Co., Saltville, Va.

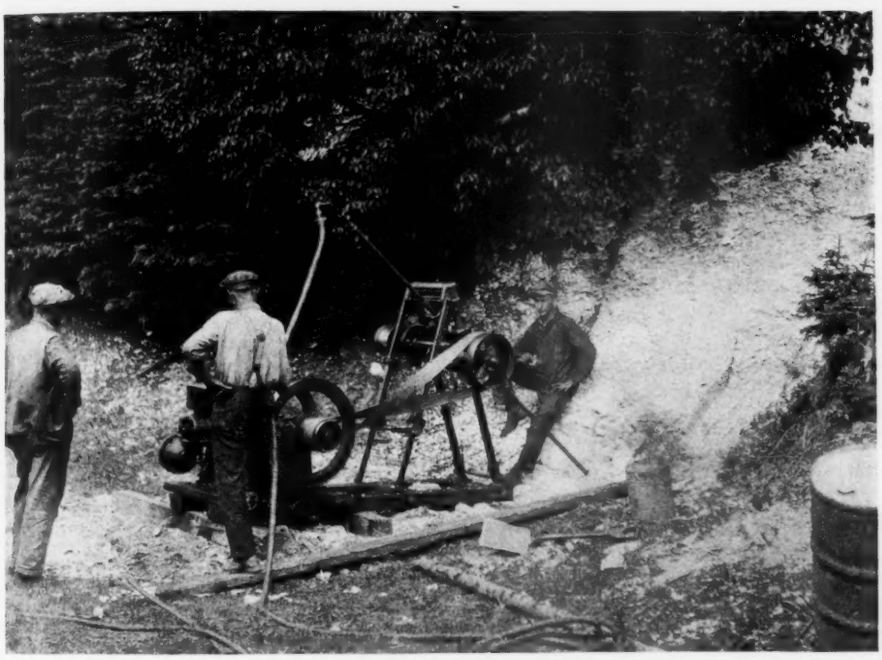
QUARRY MEN of experience appreciate the importance of determining definitely the extent of their deposit well in advance of production, and others are fast coming to recognize this advantage. When the success of the entire enterprise, as so often happens, depends upon the quantity, quality and accessibility of the deposit, it is hardly conceivable that vast amounts of money should be spent for properties and costly installations without first having determined beyond doubt the justification of such expenditures, and yet just about every so often you see or hear of this being done.

Diamond core drilling has for many years been the recognized method of obtaining such information, and it is interesting to note the increasing number of gypsum, cement, limestone and other rock companies who advocate and are using core drills continuously. While at the present time about 75% of the core drilling done is for mineral, this proportion is rapidly changing, so that it seems safe to predict that within a few years this method of development will be used equally in the non-metallic field.

Complete core drilling outfits designed for every conceivable class of work can be purchased at reasonable cost from several reliable firms in this country, or the drilling can be done economically and efficiently by contractors, who maintain crews of expert, conscientious and reliable drillmen.

Core-Drilling Costs

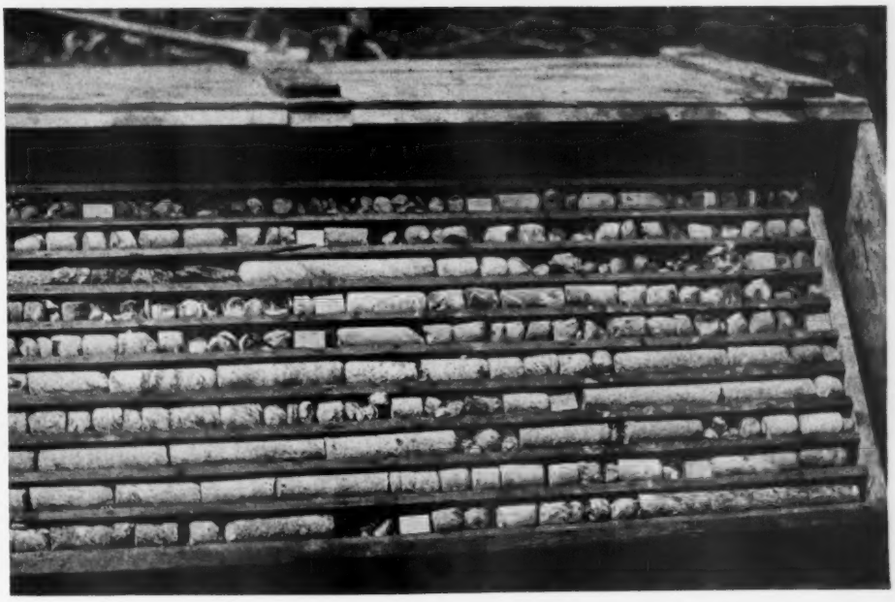
The cost of drilling varies considerably depending upon the depth to which holes are carried, the size of core desired, the location of the work and object of drilling, surface conditions, availability of adequate water supply, fuel and other items necessary to successful drilling operations. But for the purpose of a general idea we might take a concrete example of 5000 ft. of work that was done on a limestone property for $2.60 per foot, this price covering every item of expense in connection with the drilling program.



Prospecting a shallow gypsum deposit with light equipment

Conditions on this property were a fair average, not ideal nor extremely difficult. The property was laid off on 200-ft. centers; that is, there was a hole drilled every 200 ft. at right angles to, and also with, the strike of the formation. The purpose of this work was to locate and determine the extent of several seams of low calcium limestone and shale which intruded into this deposit.

As to conditions, the overburden of loam and sand, with occasion strata of fine gravel, ran from nothing to 25 ft., through which stand-pipes were driven to solid rock before using the diamond core drilling bit. Holes were from 75 to 300 ft. in depth, depending upon the elevation above quarry floor at point where the hole was started. An "A" or 1⅛-in. core was recovered, and by using the double-tube coring equipment, an 85% to 90% recovery was obtained, the only loss occurring in the very soft shale and badly broken limestone. Water was pumped 3500 ft. to the farthest hole on this property. The drilling was done with light



This core box shows a fairly good recovery made from a badly broken deposit

portable gasoline driven drills and pumps, and the moving could, in the majority of cases, be done by truck, the drill and gas engine, a single unit, being run onto the truck with light tackle, and off onto the sills at the next location, requiring but from two to four hours from the time a hole was

Two-inch limestone cores, a 95% recovery

completed until the drilling was again started on the next hole. In connection with the costs on this drilling it is essential to mention here that by laying out the entire drilling program in advance it was possible to cut the delay of moving drills, pumps and pipe lines to a minimum, as the next location, with pipe lines, could be prepared in advance and the general scheme of operations started and carried out to the best advantage.

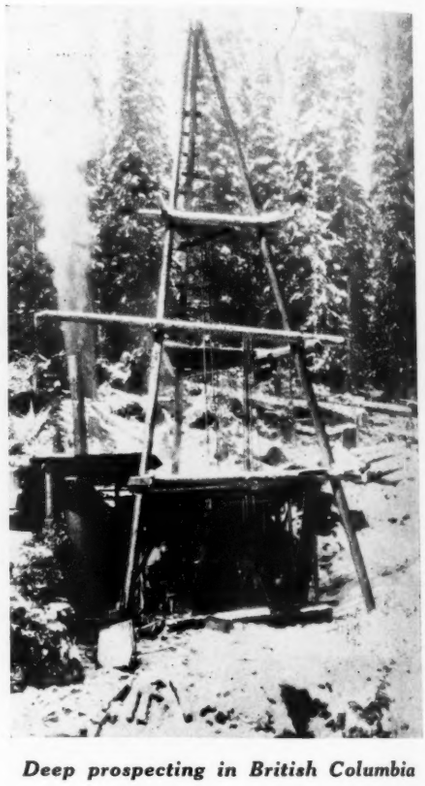
The majority of this drilling cost very little in diamond wear or breakage, the rock being fairly solid, smooth grained and soft, with the exception of the foot wall which contained small nodules of chert. Diamond cost covering the entire job, including two broken stones, amounted to approximately 32c. per foot. One stone was broken in running, possibly due to the vibration of the tools or running suddenly into hard, cherty formation using too rapid a feed, and another by dropping tools to bottom in a dry hole. Water was not returned in this hole and so caused no resistance to line of tools which accidentally slipped through the safety clamp and dropped about 50 ft., telescoping the end of core barrel over the diamond bit so that when the tools were hoisted from the hole the bit was left on bottom. This bit was recovered in a day-and-a-half's fishing and the hole continued.

The best grade of diamonds obtainable were used. This is always economy, regardless of the softness of the formation being drilled, and especially when there is the least chance of getting out of a soft formation into harder and rougher ground.

There was very little trouble from caving ground, only a very few holes requiring any casing, and these only a few feet. There were, however, very few holes in which no drilling water returned to the surface. It passed away through crevices in the formation, so that most careful attention at all times was required to know that the circulating stream of water, which is constantly being pumped through the hollow drill rods, was passing through the diamond bit.

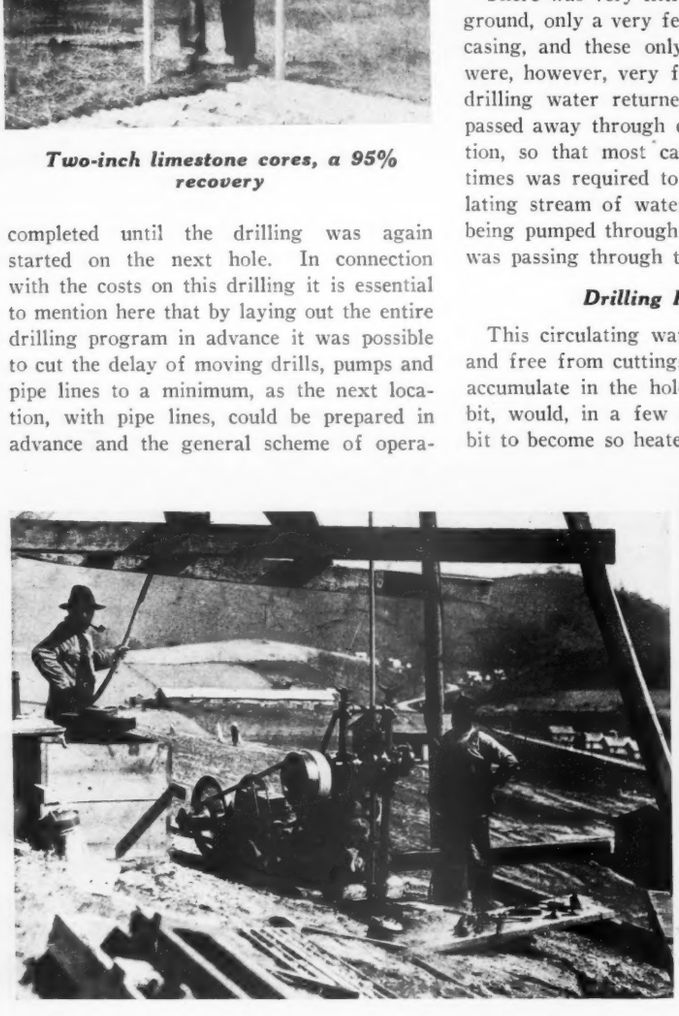
Drilling Procedure

This circulating water keeps the bit cool and free from cuttings, which if allowed to accumulate in the hole around the diamond bit, would, in a few revolutions, cause the bit to become so heated as to form a sticky clay-like cement, quickly setting up around the lower end of core barrel and diamond bit, so that no amount of upward strain or jar would loosen until this collar of baked rock, which is like neat cement, was cut away. This is done by drilling down over the entire line of tools with a larger diamond bit, from the top of hole to this baked collar of rock. There was an instance of this kind

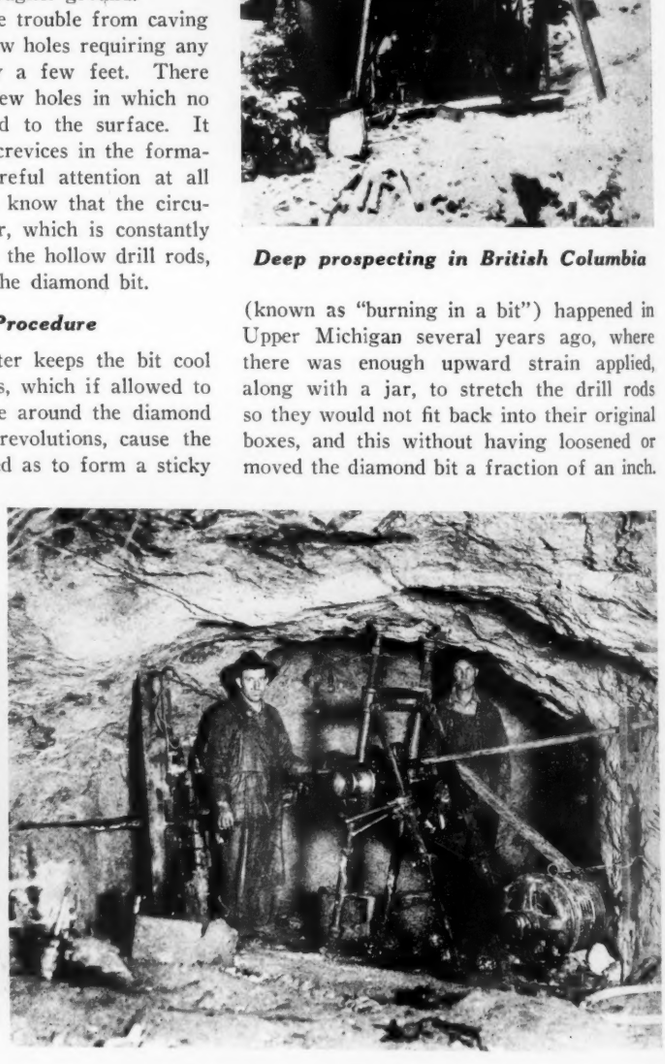


Deep prospecting in British Columbia

(known as "burning in a bit") happened in Upper Michigan several years ago, where there was enough upward strain applied, along with a jar, to stretch the drill rods so they would not fit back into their original boxes, and this without having loosened or moved the diamond bit a fraction of an inch.



Prospecting in southern Virginia. Both cement rock and brick clay were sought for in this series of drill holes



Underground prospecting in gypsum mine

The usual procedure after losing water in a drill hole is to try and wash some bran or manure into the crevice so that neat cement can be put into place and allowed to set, or to ream and case the hole beyond where it is losing water. Either method is usually costly and necessitates delay, so that unless a hole is caving, a comparatively shallow hole can as a rule be completed by a careful operator without undue risk, without stopping to bring back water.

Highest grade diamonds, known as carbons, cost from $100 to $150 per carat, depending upon size, that is, best quality in a one carat size can be bought for $150 per carat, increasing in value per carat up to a 3½- or 4-carat size at $150 dollars per carat. At the present time the principal source of supply is in the state of Bahia, in Brazil, where they are mined by the natives, using the most crude and primitive methods. Efforts have been made from time to time to introduce more modern methods and machinery to supplant the slow and laborious processes in vogue at present, but the difficulty attendant upon the transportation of heavy machinery over this region, coupled with the cheapness of local manual labor, have proven such efforts unprofitable.

The Bortz, which is a poor grade of white diamond, is sometimes recommended for drilling soft formations, and can be bought for a fraction of what the best grade black diamond sells for, but the best grade of black diamond is invariably the most economical investment in the end.

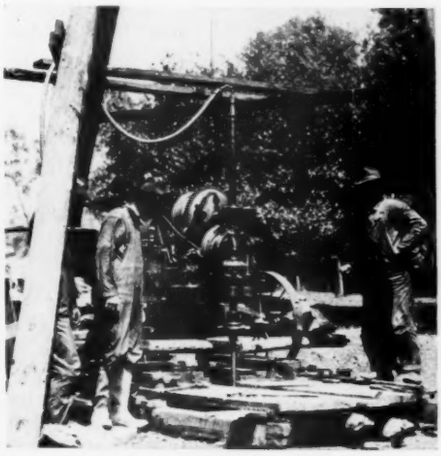
Advantages and Economy in Double Tube Coring

Double tube coring equipment is somewhat more expensive than the single tube, but here again the additional cost is an economy. All that is obtained for the money expended in diamond drilling is the report and core, so that unless there has been a fair core recovery, and the record of each hole is correct and reliable, it is money thrown away, and without very much fun in throwing it. The double tube barrel was originally developed for the soft coal formation, and used only when the drill encountered the coal seam, but it is now quite universally used for any formation in which it is difficult to get a good core recovery. This barrel is merely a barrel within a barrel, both tubes being fairly thin and not taking up any more space than was formerly required by the heavy walled single tube barrel. The core enters the inner tube, which is suspended by a ball bearing joint and does not rotate with the outer tube. This eliminates the friction and grinding action on the core, while the circulating wash water, which is being pumped through the center of the hollow drill rods, passes between the two tubes and only touches the core in passing out of the barrel on its way up the hole with its burden of cuttings.

There are very few formations where, with a little careful study of existing conditions and the proper use of these double tube barrels, a very fair core recovery cannot be obtained.

Logging the Drill Hole

Too much cannot be said regarding the care and accuracy required in keeping a detailed report and log of drill holes, and also in removing core from core-barrel and placing correctly in the core boxes, in its exact order of continuity. Core removed from the double tube barrel should be taken from the top end, this being the ground which was drilled first, and should be placed in core box first. When taken from a single tube barrel, where it cannot be taken from the top end, it should be reversed before putting into the core box. The log of a hole should not only tell how many feet of overburden there happened to be, with so many feet of limestone, shale or sandstone, as the case might be, lying immediately below this surface material, but should tell the exact nature of this overburden, and the subsequent strata. This may be extremely important data to operation later on. And this attention to detail should be taken throughout. It is often difficult to impress the importance of this upon drilling crews, but once done, the value of such a report is apparent.



Deep gypsum drilling in southwest Virginia

The limestone mentioned may be taken as an instance of the advantages to be derived from the use of core drills. This property is now being worked on a very large scale, with several steam shovels. In some instances the lower grade rock is moved and dumped as waste, while in others, where the drilling indicated an excessive amount, it is avoided and left so that in addition to first having determined the value of this property, they are now able to proceed with production most efficiently.

This means of prospecting and developing has proved to be most economical in the irregular and pockety gypsum formation of southwest Virginia, where considerably more than 100,000 ft. of drilling has been completed within the past four or five years.

Value of Core Drill in Prospect Work at Deposits

THE value of the core drill in prospecting is well known; many mines have been discovered by it. Most of the iron mines of Minnesota and Michigan have been explored by drilling rather than by sinking shafts and driving drifts. Gold was found in the Rand, South Africa, at depths of over one mile with the aid of the diamond drill. The diamond drill also has been extensively used in exploring and developing the coal and potash deposits of Europe.

Mining engineers have learned not only that mines may be discovered by the use of the core drill but also that they should be thoroughly explored with this drill before they are opened; otherwise time and money may be wasted. For example, the Uno mine on the Mesabi iron range was opened before it was thoroughly drilled; after the stripping contractors had removed over two-thirds of the overburden it was discovered that there was a large area of barren rock in the center of the proposed open-pit mine. Some 10 or 15 drills were immediately moved to the mine and the extent of the barren formation was determined. The entire plan for the opening up of the mine had to be redrafted. Numerous incidents of this kind have convinved mining engineers that a property should be thoroughly drilled before an attempt is made to open it.

In many mines diamond drills are used underground to prospect ahead of the drifts, or if a fault or a slip has cut off the ore to find the ore again. The mining industry has learned to place great dependence on the results of diamond drilling. Frequently mining properties are bought and sold on the basis of the findings of the diamond drill, and such deals often involve several million dollars. The core drill is most accurate where the ore or mineral sought occurs in large masses of fairly even composition; it finds so-called blanket or sheet deposits most easily. Oil, in order to be of commercial value, must normally occur in formations that underlie a number of acres; therefore the diamond drill is especially suitable for exploring prospective oil areas. The first oil discovered in Argentina was found in a diamond-drill hole. Further details on the use and operation of diamond core drills are published in "Diamond Drilling," Bulletin No. 243, U. S. Department of Commerce.

Illinois Geological Publications

THE Illinois State Geological Survey has issued a bulletin in which the publications on the geology of Illinois have been listed and conveniently indexed. The surveys, technical papers, investigation reports and other literature are given in brief abstract. Copies of the list are obtainable on application to M. M. Leighton, chief of the Illinois Geological Survey, Urbana, Ill.

Details of Research in Fine Grinding

Methods Used to Find Surface Exposed and Power Consumed—Grinding in Air Current

RECENT studies by Dr. Geoffrey Martin of London on the fine grinding of minerals have gone farther than any other toward solving the problem of connecting the fineness with the work done. An abstract of Dr. Martin's original paper giving the laws of grinding which were developed was published in ROCK PRODUCTS, issue of July 24, 1926.

A second paper, delivered before the British Institution of Chemical Engineers, gives some details of the methods used and also describes tests of grinding in a current of air directed through the tube mill so as to remove fine particles as soon as they are made.

Dr. Martin points out in this paper that one reason why there had been such disagreement as to the relation of energy exexpended and the fineness produced is that no accurate method of determining the exposed surface had been evolved. It had been assumed that particles were either spheres or cubes, and either assumption is far from the truth. Hence the first efforts had to be spent in finding a way to accurately determine the surface exposed by a mass of fine particles. Two years' research were needed to perfect the method used.

Method and Apparatus

The material used in the grinding experiments was pure quartz, hence the method developed was one that would apply to quartz. It was worked out by suspending a cube of pure quartz, the surface of which was known accurately, in $N/1$ hydrofluoric acid for 1 hr. at 25 deg. C. and determining the loss of weight. This loss was found to be 0.0000418 g. for every square centimeter of surface exposed. Hence if it was found that 1 g. of quartz sand lost 0.03827 g. in weight after a similar treatment (as it did in one case) the exposed surface could be calculated as $0.03827 \div 0.0000418$, or 915.5 sq. cms.

The sand had first to be treated with hydrochloric acid to remove impurities, which are more active than the sand itself and would vitiate the result if left. Apparatus had to be devised so that the samples would be treated always under the same conditions.

This apparatus consisted of a tube of celluloid or bakelite (glass is soluble in hydrofluoric acid) held on the end of a shaker arm and closed with a rubber cork. The end of the arm with the tube dips into a water bath which is kept at 25 deg. C. by a Bunsen burner with a by-pass for regulation. A thermostat in connection insured constant temperature. The shaker was run at 150 to 250 r.p.m.

For coarse sands $10N$ acid was used and for medium sands $5N$ acid, but the finer sands and the products of the tube mill (which contained fine material) were treated with N acid.

Either 0.5 or 1 g. samples were used, weighed from quartz sand which had been digested for 2 to 3 hr. in concentrated hydrochloric acid and afterwards thoroughly washed with hot and cold distilled water on a porous earthenware filter. Then 100 or 150 cc. of hydrofluoric acid were added to the sample in the bakelite or celluloid tube and the treatment begun. After treating the sand was poured into 100 cc. of ice cold water in a bakelite beaker. The contents of the beaker were then filtered through a prepared Gooch crucible and afterward dried, ignited and weighed.

Measuring the Power Consumed

To measure the power consumed in grinding an electrical method was used and this was checked by a mechanical method. This part of the paper is very complete and shows that the greatest care was taken to avoid inaccuracies. The electric power required for heating and driving various parts of the mechanism and afterward for driving the mill with a concentric load were all determined and compared with the determinations made while the mill was grinding. This was compared with determinations of the power required made with a brake of the stirrup type. The correspondence of the results of the two methods showed that the electrical method was accurate.

Summary of Test Results

Dr. Martin gives the following summary of the tests:

(1) The tube mill was run at a constant speed of 48 rev. per min. for 600, 1200, 1800, 2400, 3000, 4000, 5000, 7500, and 10,000 rev. respectively.

(2) During each test the mill was loaded with 247 lb. of 1-in. steel balls and 13.9 lb. of dry standard Leighton Buzzard sand, whose surface had been determined.

(3) After each test the sand and balls were removed from the mill, a 7-lb. sample of the ground sand removed for testing, the mill was cleaned, and the balls replaced for the next test.

(4) The surface of the sand was then ascertained and the work done in producing the increase of surface calculated from electrical measurements.

Table I shows the results.

As a result it is certain:

(1) In ordinary tube mill grinding the surface produced is accurately proportional to the work done. Double the work and the surface produced is doubled. Treble the work and the surface produced is trebled.

(2) To increase the surface of sand by 1 sq. ft. requires 60.9 ft. lb. of work when 1-in. steel balls are used for grinding in an 18 x 18-in. mill.

(3) With very prolonged grinding (over one hour or more than 3000 revolutions) more work than this is required; the very fine particles evidently "cushion" the blow to some extent.

(4) In ordinary tube mill grinding, since the effect of dust in cushioning the blow is negligible, no noticeable power saving can be effected by removing the dust during the grinding by means of an air stream.

(5) When grinding very finely indeed the effect of the dust in "cushioning" the blow becomes pronounced, and hence efficiency will be enhanced by removing it in an air stream.

Grinding in an Air Stream

Experiments made with a tube mill fitted with a fan and cyclone to remove the dust showed there was no increase of efficiency or a betterment of the product until the feed had been greatly increased above the amounts fed in the usual tests. The paper points out, however, that with very fine grinding the cushioning effect of the dust was increased and that under such conditions an improvement from the removal of the dust was to be expected. The efficiency of the mill was calculated by adding the power required by the fan to the power consumed in grinding.

TABLE I

Work done and surface produced in grinding quartz sand in an 18-in. by 18-in. tube mill, using 247 lb. 1-in. steel balls to 13.9 lb. of standard Leighton Buzzard sand.

Test No.	Expended in grinding sand, ft. lb.	Increase in sand surface, sq. ft.	Work required to increase sand surface by 1 sq. ft., ft. lb.		Time of grinding, min.	Total no. of mill revolutions	Residue on 200 I.M.M. sieve, per cent
145	243,375	3,971	61.3		12.5	600	28.2
146	470,250	7,852	59.9		25.0	1,200	2.903
147	699,190	11,170	62.6	Mean	37.5	1,800	1.046
148	892,346	14,941	59.7	60.9	49.983	2,400	1.322
149	1,097,300	17,899	61.3		62.5	3,000	1.168
150	1,407,000	22,105	63.65		81.35	4,000	1.330
151	1,811,600	26,189	69.2		105.167	5,000	1.548

(Note: Leighton Buzzard sand is the British equivalent of Standard Ottawa sand, a pure silica sand between 20-mesh and 30-mesh in size.—Ed.)

Cost Finding and Its Problems in the Sand, Gravel and Quarry Industries

VIII—Cost Reconciliation and Monthly Reports —Summary of Cost Procedure for All Plants

By Alfred Baruch
Consulting Industrial Engineer, New York City

BURDEN is so elusive in its character that it is likely to make the difference between profit and loss if it is not determined properly. Even where the burden is known, it is often applied in the wrong way so that costs are arrived at which are unfair to competition and unfair to the customers as well.

There are many methods of applying the burden to the cost, but the problem is to find the right one in each case. These methods are referred to as the blanket rate, the productive labor cost, productive labor hours and the departmental or production center rate.

Applying Burden to the Cost—Blanket Method

The blanket rate method is the one that is most often used. It makes the burden a proportion of the combined cost of labor and material and assumes that the burden will rise or fall in proportion to the rise or fall in the cost of labor. As a matter of fact the burden is fairly constant, while the price of labor fluctuates continuously. For example, as a result of his past experience the sand and gravel or quarry operator decides to charge 30% of the cost of labor and material for burden. The cost of labor and material for the year previous was $80,000, of which $50,000 was labor and $30,000 was for sand and gravel or crushed stone. In the course of the year labor takes a 50% average drop in price. That means that the cost of labor and sand and gravel or crushed stone is $55,000 instead of $80,000. By charging a blanket rate of 30% the returns for burden is $16,500, when experience shows that this should be $24,000.

Direct or Productive Cost Method

Under the direct or productive labor cost method burden is applied to labor only. Applying burden to productive labor permits monthly comparison with actual expenditures. This cannot be done under the blanket rate method since the expenses do not vary in proportion to the cost of labor and there is no way of telling whether the expenditure is justified or not.

Burden varies in proportion to the time of operation. This is true of the regular work. It incurs as much expense as it takes time. That is, if one bank or quarry face requires a month to excavate, it will take a month of supervision, insurance, rent, interest, taxes, etc. It is not fair to charge one period with all of these expenses because the rest of the time the plant is not used to its full capacity. Therefore, a fixed charge must be made based on the time the men work in each bank.

All men are not paid the same wages. Burden cannot be based directly on wages because each man incurs approximately the same amount of indirect expense. For example, two workmen performing the same duties may be getting different wages but they both require the same amount of supervision and space to work in.

Departmental Rate Method

The departmental rate becomes necessary wherever the department uses heavy and expensive equipment which involves considerable outlay of money for purchase and for maintenance. For example, a washing department where used would require buildings, conveyors, screens, motors, etc. It would certainly not be fair to charge a lot of sand and gravel or crushed stone that does not have to go through this process at the same rate as one that does. Consequently, it is necessary to set up a special departmental rate and to charge each lot that goes through the department at this rate on the basis of time required in going through or else on the basis of a fixed charge for each ton.

The burden in this case must be made up of the interest on the investment, the insurance, this department's share of the property taxes, depreciation and then the regular departmental burden rate in addition. Where the plant is large enough the same principle must be used for the quarrying, excavating, screening and washing departments.

Single Apportionment Methods Impossible

Thus, it can be seen that one method of apportioning burden is impossible all through a sand and gravel or crushed stone plant. The departmental rate or the productive hour rate then becomes the basis for measuring the efficiency of the individual department. Where the productive hour rate is used, this is done by taking the normal productive hours for a month and multiplying them by the rate. The result is compared with the actual indirect expense for that department for the month and the difference

Outline of Articles

THESE articles describe a system designed especially for the rock products industries and are elaborated by descriptions of the use of each part of the system with examples of the forms and records that must be maintained.

ARTICLES ALREADY PUBLISHED

No. 1. Introduction. (The meaning of costs, the uses of a cost system, the advantages of uniform cost methods in a competitive group, and definitions of cost terms.)—June 16, 1923.

No. 2. Classification of Materials and Expenditures. (A system of symbol identification of materials and expenses that make the distribution of costs automatic.)—June 30, 1923.

No. 3. Estimates and Orders. (The use of an estimate sheet and the control of production through the proper routing and follow-up of orders.)—July 14, 1923.

No. 4. Material Charges—August 11 and September 8, 1923.

No. 5. Labor Records—October 17, 1925.

No. 6. Overhead, Collection and Distribution—May 1, 1926.

No. 7. Proper Application of Burden Charges — December 11, 1926.

No. 8. Cost Reconciliation and Monthly Reports — Summary of Cost Procedure for All Plants—This issue.

is carried to a reserve account where it is balanced against the differences of other months. That is, if last month showed a loss for the excavating department of $250 and this month showed a gain over the standard of $300, the net gain for the two months would be $50.

Cost and Financial Statements

The statement has been made before that the chief difference between the modern methods of managing a sand and gravel plant or a quarry and the old ones is that now the owner knows where he stands much oftener than he did before and in addition he has the various elements of his business so analyzed for him that he can locate the trouble almost at once and correct it. He does this through a monthly report which tells him of the profit or loss that he has earned during the month on the plant as a whole, on the individual department, and if desired on the individual ton of material. The profit or loss on the plant as a whole is made possible through the use of standardized labor rates. The departmental profit or loss is made possible through the predetermined departmental rate which when multiplied by the number of working hours shows whether or not the expenses for this department for a month have been exceeded and also shows whether the predetermined rate is based on actual conditions. The source of information for labor costs is the daily distribution-of-time-sheets, the predetermined cost of depletion as shown by the excavating reports. The burden cost has just been explained.

Monthly Comparisons of Operation Costs

All the elements of cost are thus collected in one way or another. A comparison of the actual cost of each operation with the estimated cost of it is brought about through the form known as the Monthly Comparison of Operation Costs. This form is divided into columns headed Order Number, Sales, Profit, Loss, Labor Cost, Depletion Cost and Indirect Cost. The column headed order number should contain the order number under which each operation is performed. The sales for the period covered by the statement are shown in the sales column for each kind of material sold. If the order is only partially complete, the figure in the sales column represents the value of the quantity shipped to date. Profit or loss in this case is the difference between the sales figures and the total of labor, depletion and burden costs.

The labor, depletion and burden costs are again subdivided into two sections headed Actual and Estimated. The information for the "actual" column is obtained in each case from the Production Order issued to the plant. The burden estimated is the indirect expense allowed for in the original bid. The actual burden is the same as the predetermined rate but multiplied by the actual labor hours consumed by the operation. To illustrate we will assume that one bank, producing coarse sand and gravel, is being excavated by one steam shovel at the rate of 50 tons per hour. The predetermined burden rate is $5 per hour or 10 cents per ton. If the production at this bank should average 40 tons per hour for one week, the actual burden rate will rise to 12½ cents per ton. The above form is intended to bring together on a single work-sheet the cost of operating by work units. The prime cost necessary to this report must be obtained from the labor and excavation reports and the burden can be found by multiplying the predetermined rate by the labor hours if the production hour method is used or by the unit or departmental hours if that method is used.

The Monthly Comparison of Plant Costs

However, this method shows only profit or loss on the individual operation. The total profit or loss for the month is determined in the following manner: An itemized statement of all indirect expenses by departments is made. This statement follows the form indicated in the illustrations with the exception that it makes a comparison, item by item, with the standard cost. For example, the analysis of excavating burden in the illustration shows the average figures for each expense per month. In the monthly statement this average is placed side by side with the actual expenses and the increase or decrease for the month is shown in the adjoining column. When the actual expenses have been written the predetermined rate per excavating hour is multiplied by the number of productive labor hours in this department for the month and result is compared with the actual burden to see whether or not enough has been earned this month to cover the department's expenses. For example, we will assume that the expenses for the month have been $10,000 and the excavating hours ran to 2400 hours. The predetermined rate in the illustration given in the previous article was $5 per hour, therefore the burden earned this month is $12,000, while the expenses amount to $10,000, showing a burden profit of $2000.

The total actual and standard figures for each department are carried to a sheet known as the Monthly Comparison of Plant Costs. The totals of each department are added, making a total plant burden, to which is added the direct labor cost, the supplies purchased and the inventory at the first of the month. From the total of the above figures is subtracted the inventory at the end of the month as shown by stock records to give the net plant cost for the month. To the net plant cost is added the office and selling expenses, which gives the total cost for the month. The total cost is subtracted from the sales for the month as shown by the Monthly Comparison of Operation Costs, which gives the plant profit for the month; that is, the profit on operations alone.

Interest and Depreciation in Plant Costs

Interest as a part of the cost has been the occasion for much debate and a word must be said about it. Interest is usually confused with profit. Profit is what is left after all expenses and charges have been paid off. It is a reward to a business man for taking the risk of engaging in business. It is true that a man cannot govern the price by including interest in his cost and that the mere act of his charging interest does not mean that he will get it back in his price. But neither does charging his salary or rent mean that he will get them back. That is the risk that he takes when he goes into business. However, the fact that he will not get it back does not mean that it is not part of his cost. If a man should borrow money to operate his business he would certainly have to pay interest on it before he could declare a profit.

Rent and interest are very much alike. A man pays rent when he has not the money to buy the building he is in. He may prefer to borrow the money and buy the

MONTHLY COMPARISON OF EXCAVATING BURDEN

Charge No.	Expenses	This Month	Standard	Increase	Decrease
		LABOR			
300	Foremen (two men)	$ 450.00	$ 450.00	.....	.....
301	General help (eight men)	1,400.00	1,400.00	.....	.....
302	Diggers (10 men)	900.00	900.00	.....	.....
303	Special help (engineer)	40.00	40.00	.....	.....
		SUPPLIES			
320	Repairs	147.00	150.00	.....	3.00
321	Oil	62.00	50.00	12.00	.....
322	Small tools	75.00	50.00	25.00	.....
323	Nails	2.00	5.00	.....	3.00
324	Coal	1,200.00	1,300.00	.....	100.00
325	Miscellaneous	400.00	300.00	100.00	.....
		APPORTIONED EXPENSES			
	TAXES	120.00	110.00	10.00	.....
	Stock insurance	40.00	40.00	.....	.....
	Light (30% of $200)	45.00	60.00	.....	15.00
	Power (60% of $600)	375.00	360.00	15.00	.....
	General expense	2,300.00	2,400.00	.....	100.00
	Total	$7,556.00	$7,615.00	$162.00	$221.00

building rather than to pay rent on it. In that case, interest on the borrowed money would become a substitute for his rent. Or suppose that an operator wishes to substitute a steam shovel for hand diggers and that in order to do this he must borrow the money with which it buy the machines. The interest that he has to pay for the borrowed money in this case becomes the substitute for labor wages that he has paid. Thus interest is really a part of the cost, but the conclusion is forced on us that interest on the plant investment is inseparably a part of the plant cost. Interest and rent are essentially the same.

Depreciation

Another part of the cost that is often ignored is depreciation. Machinery wastes away and some kind of provision must be made to replace it. It is not enough to think that the earnings will take care of replacements. A reserve fund must be set aside with which the new improvements can be bought. This is actually necessary to keep the plant up to the latest developments in equipment if for no other reason. Depreciation may take place due to wear and tear, to decay, to neglect and to obsolescence.

In order to provide for a depreciation reserve it is necessary to find a systematic method of evaluating the equipment and the assets. The two best methods are known as the schedule rate method and the second is the percentage on value. The schedule rate method makes a flat charge every year. Assume that a piece of equipment is worth $1000 and that its expected life is 10 years, at the end of which time it should be worth $100 as scrap. The remaining $900 are divided by 10, which gives a yearly rate of $90.

The percentage on value method would take a certain figure, say, 10% of the appraised value every year as the basis for depreciation charges. In the case cited above at 10% the first year's charge would be $100, the second year's charge would be $90, which is 10% of that year's valuation of the equipment mentioned; the third year would be $80, and so on.

Summary of Cost Procedure for the Sand and Gravel and Quarry Plant

In order to make the procedure described in the previous articles perfectly clear and to show how really simple this system is in application, the successive steps in the cost routine are given below in outline form.

Sales Orders

In most plants the quantity of sand and gravel or crushed stone shipped each day will depend on the orders that have been received for it. As the units of sale at the plant are more or less uniform, being usually a barge load or a car load, the analysis of the sales orders to determine the tons of material that must be excavated to fill these orders can be determined easily.

Production Orders

The production order should summarize the material on the various orders. This order should be written on a regular form designed for the purpose showing:

1. The kind of sand or gravel or crushed stone wanted.
2. The bank or quarry face from which it must be withdrawn.
3. The date.
4. The order number.
5. The quantity to be excavated.

The body is blank, allowing space for the operations and the cost of labor and burden. This order is now forwarded to the plant superintendent, one copy of it having been kept in the files for reference. The files are kept in the office in chronological order so that the plant manager may take up each day the orders to be filled.

Labor

The time spent on this order is recorded either on the distribution-of-time sheets or on the individual cards showing the order number, the number of tons excavated and washed. The preferred method is the distribution-of-time sheets which charges each order with the time spent on it.

Expense Routine

The foreman in the excavating department discovers that he needs new packing for the cylinder of his steam shovel. He makes out an expense charge slip which is a request upon the storeroom for the packing, whether the storeroom keeps it in stock or has to buy it. The expense charge slip shows the account to which this particular expense is to be charged and it is filed in the office under that number.

Reconciliation of Cost

When the sand and gravel or crushed stone is loaded on the barge, truck or box car a report of the number of tons loaded is made out. This is called a work sheet. The plant clerk collects all the time sheets containing this order number and totals up the cost of labor. The tonnage indicates the burden to be charged as the final burden which is figured out on a per ton basis as explained in the previous article. That is, it is determined that the plant can turn out 1000 tons of sand and gravel or crushed stone per hour and the total burden per hour is divided by the 1000 tons to determine the cost per ton. The plant clerk's copy of the order returns to the office after all extensions for labor and burden have been made.

Rock Phosphate in 1925

IN 1925 the quantity of rock phosphate sold or used by producers in the United States amounted to 3,481,819 long tons, an increase of 614,030 tons or 21% over 1924, according to reports compiled by the Bureau of Mines, Department of Commerce. This has been only exceeded by the record year of 1920. The total value of the rock increased $1,293,595, or 13%, and nearly equaled the value of 1923. Average selling value per ton for 1925 was $3.32 or 25 cents less than that of 1924. Quantity sold or used in 1925 was greater than the quantity mined by 228,142 tons or 7%, the excess being supplied from stocks held over from the preceding year.

Phosphate rock mined in 1925 was 3,253,671 tons, an increase of 14% over 1924. All the producing districts showed increases, the highest, 106%, occurring in the western states. The total output of these states, however, is not large, so the great increase had a relatively small effect on the total. Estimated stocks at the end of 1925 amounted to 490,960 tons, or less than those of the two preceding years.

Phosphate rock sold to blast furnaces in 1925 was 25,801 tons, a decrease of 30% from that sold in 1924. The quantity sold for manufacture of phosphorus and chemicals containing phosphorus was 129,955 tons, or an increase of 20% over 1924. Rock phosphate sold as an ingredient of stock food was 2605 tons, a decrease of 233 tons from 1924. Demand for concrete aggregate in Florida in localities where sand and gravel or crushed stone were not always available caused the marketing of about 4000 tons of rock phosphate for this purpose in 1925. Exports of rock phosphate increased 6% in quantity and 11% in value in 1925. The quantity exported was greater than for any year since 1920.

Florida produced about 84% of all the rock phosphate sold or used in the United States during 1925. The greater part of the production in this state consisted of land pebble phosphate. Price conditions were better than in 1924, an increase of 20% in quantity and 10% in value being reported. The next largest producers were Tennessee and Kentucky. In these states quantity increased 20% and value 19% over 1924. South Carolina again started production in 1925, after having no output in 1923 and 1924. The differential in freight rates between Florida, Tennessee and Kentucky shipping points and the western consuming market provided the stimulus for the opening up and developing of phosphate mines in the western and Pacific coast states. The better financial conditions of the farmers and a growing appreciation of fertilizer advantages contributed also to the great increase of production in 1925 from these mines.

Correction

AN error in the abstract of William E. Stanley's paper on the use of crushed stone for sewage disposal, read at the National Crushed Stone Association's convention at Detroit, gave the amount of crushed stone so used as 194,000 cu. yd. and of slag 10,500 cu. yd. The figure, 10,500, should have been ascribed to crushed stone and slag and cinders should have been credited with 194,000 cu. yd.

"Quarrying" Sand in England*

British Operators Cautioned Against Entering the Business Without Extensive Preliminary Survey

By Alfred B. Searle
British Consulting Technologist to the Stone Trades

TO those who have no experience of the subject, the quarrying of sand seems to be one of those childishly simple propositions which anyone might take up and run no risk of failure. Yet so deceiving are appearances that I have known a number of men who failed miserably in their attempts to get sand from their quarry into carts or trucks at a price which was profitable. There are many reasons for such failures, just as there are many reasons why some sandpits are working at a bare profit when they ought to be making a good return, and I gladly accede to our editor's request that I should write down some of the precautions which should be taken in quarrying sand.

Extent of Deposit a Necessary Factor

At the risk of appearing foolish my first suggestion would be: "First, be sure of your sand," for several enterprising people have started getting sand only to find that after they had been going for some time the supply of sand ran out. One place I remember very vividly because of the tragedy of it. A manager lost his position because of the sale of the property to another firm, and so he decided to start selling sand. He found an excellent bed of sand alongside a main road and not too far from a station, secured a partner, and went to work. For some months all went well and the customers were pleased to give good orders, when suddenly the men ran into a bank of gravel almost destitute of sand. On going over to investigate I found that shortly beyond the gravel was a bed of stone and that there was scarcely any sand except that beneath the office and some cottages which had been erected for the men. On the other side of the road were ample supplies of sand, but, alas, that land was not available and so the quarry had to be converted from a sand-selling to a gravel-selling proposition, and as the latter was not profitable, the place was eventually closed down.

This catastrophe might have been avoided had a few trial holes been dug before starting the pit, or even if competent advice had been obtained, for the geological indications showed the irregular and uncertain disposition of the sand. It may seem a waste of money to make extensive tests and investigations before purchasing a site, but my experience has shown over and over again that the right kind of technical advice obtained before operations are commenced is worth all that it costs and sometimes saves prospective quarry owners from disaster.

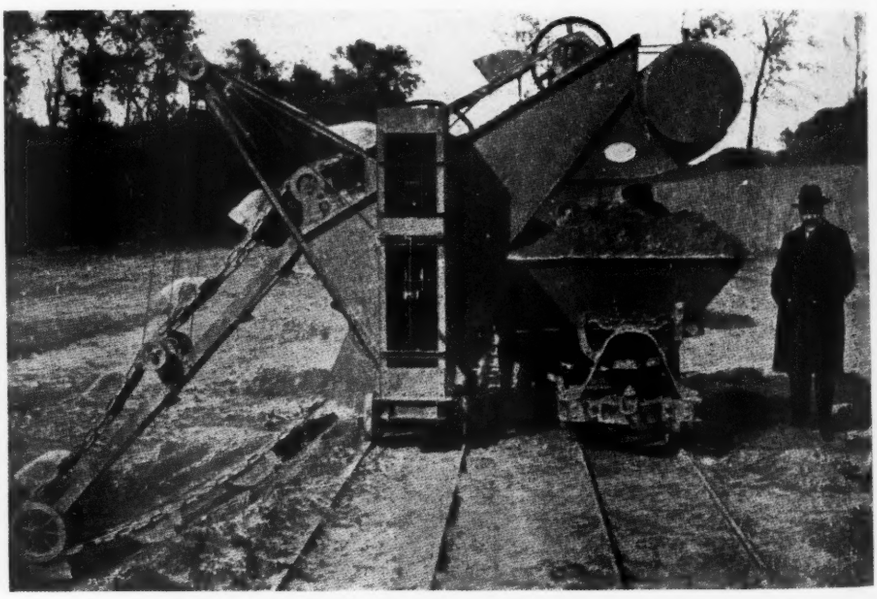
Market Analysis

The next precaution, which is almost equally as important as the first, is to see that the sand can be sold in sufficiently large quantities over a sufficient number of years to justify the capital and other expenditures which is necessary to open out and maintain the quarry. Here, again, it is surprising how many people fail to take this simple precaution, and so lose large sums in money quite unnecessarily. "Market analysis" is quite as necessary in quarrying as chemical analysis is in determining the nature of the material.

If the sand is there in sufficient quantity, and the demand for it exists or can be created quickly, there is the further question of the price to be paid for the land or the royalty on the sand, and here again it is often profitable to secure expert advice; a shilling a ton may not seem a heavy royalty, but in actual fact it may be double what need be paid, or would be paid, by anyone sufficiently well acquainted with the locality. There are definite means of valuing sandpits and similar deposits, and in simple self-defense the prospective owner should not work in the dark in such a matter.

When a suitable deposit of sand has been obtained it is next necessary to decide upon the best method of working it. Conditions differ so much that it is almost impossible to lay down any definite rules, beyond saying that if the wagons or "tubs" loaded with sand can travel downhill it is clearly better than if they have to be hauled uphill, though even this is not invariably the case. Much must, of course, depend on the part of the site on which the trucks or carts can best be brought, and the position of a road or the railway may be a determining factor in one case and of no importance in another. Yet it is surprising how many sandpits have been started at the wrong end of the site, so that no advantage could be taken of gravity in moving the material and in insuring good drainage from the face.

In selecting a site, special attention should be paid to (1) the overburden; (2) the position of the dip and strike of the strata; (3) the drainage of the face and workings generally; (4) the water supply, as it may be necessary to wash some of the sand; (5) the gradient to screens and thence to



English sand excavator and elevator of special design

*From *Quarry Managers' Journal*, the first article for a sand and gravel department begun in the November 8 issue of this journal. Mr. Searle is among the best known of British writers on the rock products industries, both of books and magazine articles. Many of his writings have been printed in ROCK PRODUCTS.

the loading place; (6) the position of the railway or main road; (7) the position of a power station or engine house, and for screens, crushers, washers, etc.; and (8) transportation facilities. If even one of these is wholly unsatisfactory and cannot be made suitable, it will usually be wise to abandon the site.

Efficient Operation Plan

The laying out or planning of the quarry cannot receive too much skilled attention, for on this the whole success or failure of the business may depend. It is no use deferring this planning to an indefinite date in the future, for in that direction lies loss if not failure. The plan should be complete before work is started, for one of the commonest sources of loss is the needless handling of material.

A further important factor is the figure obtained by multiplying the weight of the materials to be moved by their distance, as this should be kept as low as possible. At the same time it may pay to move some of the material or the empty trucks over a longer distance than is absolutely necessary if by so doing a more systematic and simpler handling of the wagons can be arranged.

At one time the owner of sandpits never thought of employing any machinery for digging the sand, but it is now profitable in many pits to employ a small excavator such as that shown; this will dig 12 cu. yd. per hour, with an expenditure of 5 hp., the material being dug at any depth not exceeding 5 ft. below the surface, and delivered into a wagon or cart not more than 5 ft. 6 in. high. The machine works quite automatically, hauling the wagon with it while loading, and the man in charge can devote almost the whole of his time to keeping the machine supplied with wagons.

Where the overburden is not more than 7 ft. thick, and the ground is fairly regular, a traveling shovel with a rotary cutter may be used with great advantage, as it can remove 50 cu. yd. per hour with an expenditure of 7 pt. of petrol and the services of one man. With careful planning, the overburden can be placed where it is out of the way without carrying it in wagons.

To use machines of this kind, or indeed any machines for saving labor in a sandpit, the most careful planning is essential. It is easy to tell men to work in another part of the pit, but a machine, once started, must be kept at work as planned. The pattern of machine to be used must depend on the nature of the ground, a different machine being used for a level site from that for a very irregular one.

Even when the site is level, the floor of the pit should be arranged so as to have a slight slope away from the face so as to insure good drainage, and care should be taken that the drainage is kept in good order. A dirty floor in the pit cannot help causing losses.

Filter Sand Plant of Stewart Sand Company

THE filter sand plant of the Stewart Sand Co. of Kansas City, Mo., was built in 1926 to supply a local demand for filter sand. Up to the time it was built much of the filter sand used in Kansas City and surrounding towns was brought by rail from the Mississippi river and from points still farther east, which made it an expensive commodity on account of the freight rate.

The Stewart Sand Co. digs sand from both the Kaw river and the Missouri river. The Kaw river sand was judged to be of good quality for making filter sand, but it was thoroughly tested for the purpose before a plant was built. Chemical analysis showed it to be high in silica and free from limestone, and the screen analysis showed a sufficient number of grains of the needed size so that the operation of a plant would not require the handling of so great a tonnage as to make it unprofitable. There were exceptional facilities for securing a good feed for a filter sand plant for the company was operating a plant in which five hindered settling classifiers in series were employed (see Rock Products, April 17, 1926) and the discharge of two of these classifiers contained a large proportion of grains of the size wanted.

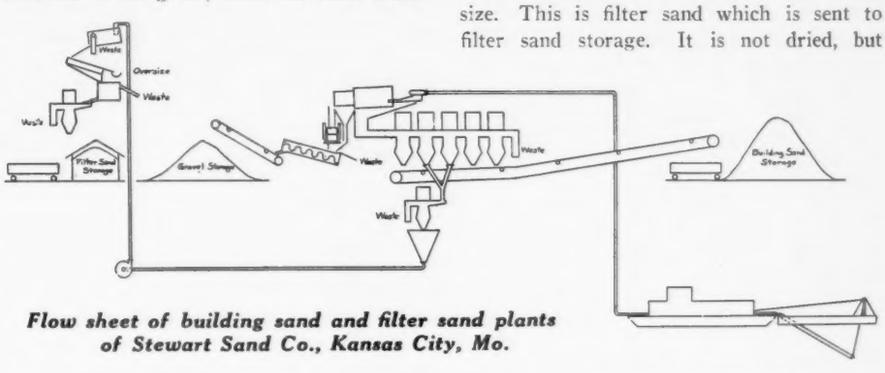
There are two methods of separating sand into sizes, screening and classification by currents of water. Neither will do the same work as the other, for one works on the diameter of the grain, while the other works on the weight of the grain. As the final product was to be bought and sold on screen sizing, a screen had to be employed somewhere in the process, but classification could be used to make a partial separation to relieve the screens of too large a tonnage.

The plant as first designed had two Hummer screens, the filter sand being the product passed by the coarser and retained on the finer. It was found difficult to get satisfactory screening on the finer screens, which was not surprising, as the makers of the screens, the W. S. Tyler Co., had predicted this would be the case if the material was screened wet or damp. So a classifier was substituted for the fine screen and this not only made a better product than the fine screen but enabled it to be changed easily.

The plant layout is shown in the accompanying diagram, connected up to the building sand plant from which the feed is taken. The feed for the building sand plant comes from the dredge shown in the lower part and is pumped to a screen which takes out the gravel. The gravel is washed and the oversize crushed.

The sand goes through five hindered classifiers in series, each making a finer product than the one preceding. The products of the second and third classifiers contain practically all the grains of the size wanted for filter sand, so these are led across the belt that conveys the remaining classifier products to the building sand storage pile. The filter sand feed goes to a classifier (shown below the belt in the drawing) which takes out some of the fines.

The discharge of this classifier goes to a cone that serves as a sump and runs through a pipe to a centrifugal pump that lifts it to the top of the filter sand plant proper. The pump discharge falls in a box in which it is dewatered, the overflow going to waste. The sand with some water then flows over a Hum-mer screen which takes off everything coarser than filter sand. The undersize of this screen goes to a second classifier which removes the fines, which are sent to waste, leaving the classifier product free from both oversize and undersize. This is filter sand which is sent to filter sand storage. It is not dried, but loaded damp from the pile for shipment.



Flow sheet of building sand and filter sand plants of Stewart Sand Co., Kansas City, Mo.

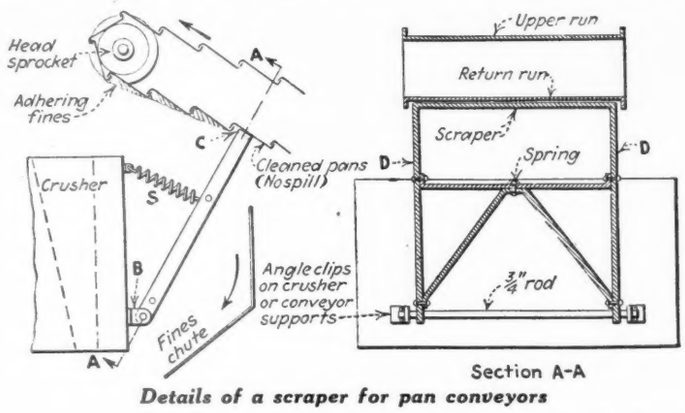
The plant does excellent work, producing a filter sand in every way comparable with that which is made by drying and screening. The cost of production is considerably less, as drying sand is expensive and a much greater quantity has to be dried than can be sold as filter sand. However, classification and screening probably has a somewhat higher cost than simply screening, due to the cost of pumping the water used in the classifiers.

A micro-photograph of the filter sand from this plant is given on page 49 of the February 5 issue of Rock Products and shows the uniformity of the grain size.

Hints and Helps for Superintendents

Beaded Pan Conveyor Scraper

IN some plants where beaded pan conveyors are used to carry wet sticky material to the crushers, the use of a scraper to remove the fines sticking to the return run of the feeder, would eliminate the accumulation of the material beneath the feeder. A scraper for this purpose which is shown in the accompanying sketch was described by J. C. Stoddard in a recent issue of *Engineering and Mining Journal* and is said to have been sucessfully used at one plant. As may be seen, the construction and installation are quite simple and may be readily made by an ordinary plant mechanic.



Details of a scraper for pan conveyors

For a feeder four feet wide the scraper is construced of one piece of 3-in. by ¼-in. iron bent as shown in section *A-A* and is hinged at points *B* so that the scraping edge *C* cleans off each pan as it comes around. The spring *S* causes the scraping edge to bear firmly against the pans and to cut all adhering material loose so that it falls into a bypass chute and thence to the crusher discharge. It will be noted that the side arms *D* cause the scraper to snap from one pan to the next and at the same time prevent the scraping edge from becoming caught in the return run of the feeder or in the depressions between the pans. The arrangement should be mounted so that the horizontal part which does the scraping is parallel to the face of the individual pans, so that no material may become caked in the depressions between the pans.

Enclosing a Revolving Screen in a Cylinder

WHERE a revolving screen is not mounted with any enclosure, as it is when it is placed over a bin, the usual way to mount it is to place it in a box with a sloping bottom which serves a chute for the undersize. This takes considerable headroom. The arrangement shown in the cut takes almost no headroom and delivers the undersize at the end of the screen where it can be turned into a chute, a conveyor or an elevator as desired.

The screen shown here is hexagonal, although a cylindrical screen could be mounted in the same way.

The cylinder is fastened to the screen and moves with it and the rotation sends the undersize to the end in the same way that the material travels through the screen.

Provision has to be made for changing screens, and to do this the cylinder may be made in two parts fastened together by bolts. The cylinder is fastened to the screen frame by shoulder bolts (two of which show in the cut) and by removing the nuts from these the cylinder may be taken off.

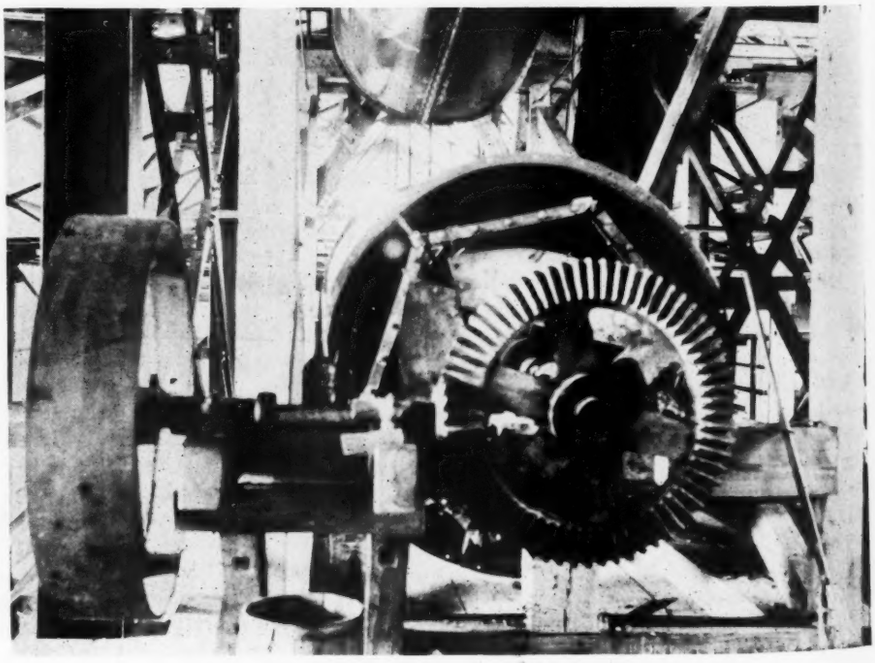
In this plant one screen of this type is placed above another. The cylinder containing the upper screen shows in the cut. The picture was taken during the construction of the plant and before the chutes connecting the screens were installed. These screens are used at the Krause, Ill., plant of the Columbia Quarries Co., St. Louis, Mo.

Handling Electric Detonators

ELECTRIC detonators and squibs should be handled very carefully, cautions the Bureau of Mines, Department of Commerce. Rough handling may break the bridge-wire connections. Bringing electric detonators into contact with any source of current may cause enough current to flow in the bridge wires to heat them to firing temperature. Serious accidents may result from the explosion of the detonator alone.

The best practice, and the one which is required by law in several states, is to keep electric detonators in non-conductive boxes or bags until the shot firer is about to use them, and then to remove only the supply immediately needed. Electric detonators should be so removed from their boxes that the ends of the leg wires do not come in contact with any source of current; even telephone, signal and portable electric-lamp circuits carry enough current to fire them. One precaution advocated by the Bureau of Mines is to twist the bared ends of electric detonator leg wires together at the outside of the mine and keep them so until just before firing, then untwist them and connect them to the firing lines.

Electric squibs and detonators should be stored in a cool, dry place. If they are left for a long time in a warm place the waterproofing material in the insulation of the leg wires dries out and the insulation may break when the legs are bent and misfires may result in wet holes.



Rotary screen enclosed in a cylinder

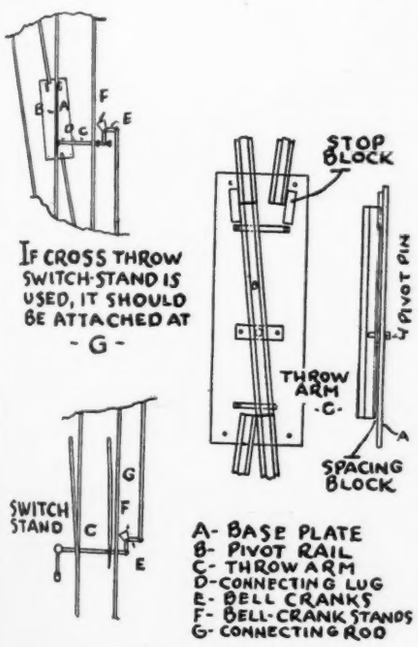
Using a Generator for a Motor

IN a plant using direct current a generator may be used for a motor without loss of efficiency. The cut shows a direct current generator driving a 10-in. pump at the plant of the Edison Portland Cement Co., New Village, New Jersey. The current at this plant is 250 v. and the generator is rated at 100 kw. according to the name plate. The combination raises 8500 g.p.m. to 50 ft. as its ordinary duty.

Direct current generator used to drive a pump

Frogless Switch

CONSIDERABLE trouble was experienced with wheels breaking on the 66 cu. ft. cars used in an underground electric hauling system. C. M. Haight, Franklin, N. J., was of the opinion that the numerous frogs in the track were the contributing causes toward this breakage and with this in view developed the frogless switch as described and illustrated in a recent issue of *Mining and Metallurgy*. His original idea ran towards the use of a spring frog,



Details of a frogless switch

but the 30 lb. rails in use were too small for such a device to be made which would also stand the work.

The device, as developed by Mr. Haight, is based on the replacement of the frog by a pivoted rail, the rail to be thrown at the same time as the switch point and by the same mechanism. The accompanying line cut shows the switch point and frog rail as installed.

Six of these switch points and frog rails have been in service now for the past three years and are said to have caused no trouble. They are not equipped with spring throws, which would add to their efficiency, as then the slack due to the links would be taken care of.

Computing Volume of Slurry in Horizontal Cylindrical Tank

SOMETIMES it is necessary to know the number of gallons of cement slurry or liquid for any depth in inches in a cylindrical tank lying horizontally. The standard handbooks do not give this information in the required units, the closest table being computed on a 3-in. basis.

The following formula has been devised by Edgar S. Ernst, Rapid City, S. D., and is applicable to a depth equal to the radius of the tank. Its adaptation to greater depths will be readily suggested to the user when it is realized that an increase in depth beyond the middle of the tank will increase the volume of the liquid by the same amount that a corresponding lowering in depth below the middle of the tank would decrease it.

Gallons per r-x depth in inches =

$$\frac{\pi r^2 L}{462} - \frac{L}{231}\left(x\sqrt{r^2-x^2} + r^2 \sin^{-1}\frac{x}{r}\right)$$

Where L = Length of the tank in inches.
r = Radius of the tank in inches.
X = r minus depth of the liquid in inches.

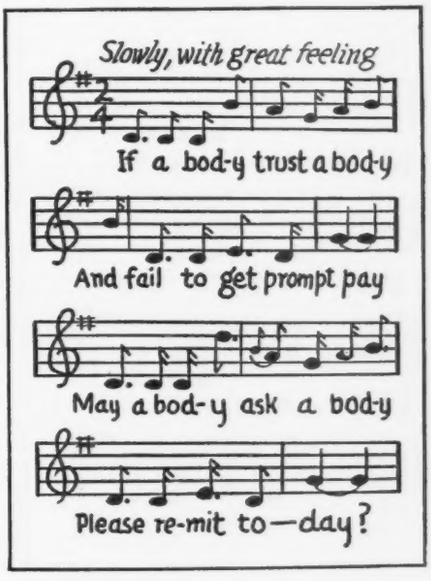
Note: $Sin^{-1}\frac{x}{r}$ is expressed as a fraction of $\frac{1}{2}\pi$.

A Musical Rubber Collection Stamp

ABOUT one year ago *Building Supply News* published the accompanying reproduction of a rubber stamp suitable for placing upon statements going out to delinquent customers, in an effort to get them to settle up quickly without getting peeved in the least.

This rubber stamp was originally suggested by the Niles (Ohio) Fuel & Supply Co., being a stunt used there.

A short time after the first appearance of this stamp in *Building Supply News*, a second verse to it was written by D. T. Albery of the Northwestern Terra Cotta Co. These are the lines he suggested:



A "hint" for past due collections

If a body bill a body
In such a pleasant way,
Then should this body send that body
Cash without delay.

But a third verse has been suggested by another member of the industry, who says:

"If you're willing to 'cut it short,' then let's make this the third and last verse:

"If a body trust a body
And failed to get that pay,
Then this somebody warns a body
The sheriff is on the way."

The last two verses have not been put up in rubber stamp form. Only the first and original is available.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)[2] new stock	Feb. 14	No par	39	39	75c Jan. 15
Alpha Portland Cement Co. (preferred)[2]	Feb. 14	100	115	.....	1¾% quar. Mar. 1
Arundel Corporation (sand and gravel—new stock)	Feb. 15	No par	32	32⅛	45c qu., 20c ex. Jan. 3
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	Feb. 14	.....	110	112	
Atlas Portland Cement Co. (common)[2]	Feb. 14	No par	41⅛	42	50c qu. Dec. 1, $1 ex. Jan. 12
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)[2]	Feb. 14	33⅓	42	42	2% quar. Jan. 3
Beaver Portland Cement Co. (1st Mort. 7's)[6]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (common)[4]	Dec. 17	100	135	.....	1½% qu.; $4 ex. Dec. 31
Bessemer Limestone and Cement Co. (preferred)[4]	Jan. 13	100	108	109½	1¾% quar. Dec. 31
Bessemer Limestone and Cement Co. (convertible 8% notes)[4]	Dec. 17	100	99	100	8% annual
Boston Sand and Gravel Co. (common)	Feb. 12	100	73	75	1% qu., 2% ex. Jan. 1
Boston Sand and Gravel Co. (preferred)	Feb. 12	.....	.....	85	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	Feb. 12	.....	.....	90	2% quar. Jan. 1
Canada Cement Co., Ltd. (common)	Feb. 14	100	137¾	137½	2% Jan. 4
Canada Cement Co., Ltd. (preferred)[11]	Feb. 12	100	119	120	1¾% quar. Feb. 16
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	Feb. 12	.....	101	102½	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	Feb. 12	100	93	96	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Feb. 12	No par	22½	.....	75c Jan. 12
Charles Warner Co. (preferred)	Feb. 12	100	100	104	1¾% quar. Jan. 27
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929[18]	Feb. 12	100	102½	103½	
Cleveland Stone Co. (new stock)	Feb. 14	.....	50	55	50c qu.; 25c ex. Mar. 15
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	Feb. 14	100	104	.....	
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	Feb. 14	100	97	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	Feb. 14	100	95	100	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	Feb. 11	100	100	102	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	Feb. 14	100	98½	100	
Dolese and Shepard Co. (crushed stone)[7]	Feb. 14	50	91	99	$1.50 Jan. 1, $1.50 ex. Jan. 1
Egyptian Portland Cement Co. 7% pfd.[21]	Feb. 14	.....	92	100	1¾% quar. Oct. 1
Egyptian Portland Cement Co. (common)[21]	Feb. 14	.....	7	9½	40c quar. Oct. 1
Giant Portland Cement Co. (common)[3]	Feb. 14	50	60	70	
Giant Portland Cement Co. (preferred)[25]	Feb. 14	50	40	45	3½% and 19% ex. Dec. 15
Ideal Cement Co. (common)	Feb. 14	No par	80	83	$1 quar., $1 ex. Dec. 15
Ideal Cement Co. (preferred)[6]	Feb. 11	100	105	108	1¾% quar. Dec. 15
International Cement Corporation (common)	Feb. 14	No par	49½	49¾	$1 quar. Dec. 31
International Cement Corporation (preferred)[3]	Feb. 14	100	105⅛	105⅞	1¾% quar. Dec. 31
Kelley Island Lime and Transport Co.	Feb. 14	100	132	133	$2 quar., $2 ex. Jan. 2
Lawrence Portland Cement Co.[2]	Feb. 14	100	98	105	2% quar.
Lehigh Portland Cement Co.[6]	Feb. 14	50	93	96	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1927 to 1931)[13]	Dec. 18	100	98	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1931 to 1935)[13]	Dec. 18	100	97	98½	
Marblehead Lime Co. (1st Mort. 7's)[14]	Feb. 11	100	100	.....	
Marblehead Lime Co. (5½% notes)[14]	Feb. 11	100	99	100	
Michigan Limestone and Chemical Co. (common)[6]	Feb. 14	.....	26	28	
Michigan Limestone and Chemical Co. (preferred)[6]	Feb. 14	.....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	Feb. 15	25	52	.....	50c Feb. 1
Monolith Portland Cement Co. (common)[9]	Feb. 10	.....	12¼	12¾	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	Feb. 10	.....	30¾	32¼	
Monolith Portland Cement Co. (preferred)[9]	Feb. 10	.....	9½	9¾	
Nazareth Cement Co.[26]	Feb. 14	No par	33	.....	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	Jan. 28	.....	120	.....	
New England Lime Co. (Series A, preferred)[14]	Feb. 11	100	.....	95	
New England Lime Co. (Series B, preferred)[23]	Feb. 14	100	94	.....	
New England Lime Co. (V.T.C.)[22]	Feb. 14	.....	33	36	
New England Lime Co. (6s, 1935)[14]	Feb. 11	100	99	101	
North American Cement Corp. 6½s 1940 (with warrants)	Feb. 14	100	90	90½	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[19]	Aug. 14	.....	94	99	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Nov. 8	.....	20	22	
North American Cement Corp. (preferred)	Jan. 28	.....	.....	.....	1.75 quar. Feb. 1
North Shore Material Co. (1st Mort. 6's)[15]	Feb. 14	100	98½	100	
Pacific Portland Cement Co., Consolidated[5]	Feb. 11	100	74	.....	25c mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	Feb. 11	100	96½	.....	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	Jan. 28	10	5¼	6	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	Feb. 14	100	100	100½	
Pennsylvania-Dixie Cement Corp. (preferred)[28]	Feb. 14	100	99	.....	1¾% March 15
Pennsylvania-Dixie Cement Corp. (common)[28]	Feb. 14	.....	34⅞	35½	80c April 1
Petoskey Portland Cement Co.[7]	Feb. 14	10	9½	10	1½% quar.
Pittsfield Lime and Stone Co.[21]	Feb. 14	.....	.....	100	
Pittsfield Lime and Stone Co.[21] (common)	Feb. 14	.....	.....	25	
Rockland and Rockport Lime Corp. (1st preferred)[10]	Feb. 12	100	103	105	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred)[10]	Feb. 12	100	60	.....	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common)[10]	Feb. 12	No par	50	52	1½% quar. Nov. 2
Sandusky Cement Co. (common)[3]	Feb. 14	100	120	125	$2 qu., $4 ex. Jan. 1
Santa Cruz Portland Cement Co. (bonds)[5]	Feb. 11	.....	106	110	6% annual
Santa Cruz Portland Cement Co. (common)[5]	Feb. 11	.....	82	.....	$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Feb. 11	.....	23¾	24	
Schumacher Wallboard Corp. (preferred)	Feb. 11	.....	27¾	.....	
Superior Portland Cement, Inc. (Class A)[20]	Feb. 10	.....	44½	44¾	
Superior Portland Cement, Inc. (Class B)[20]	Feb. 10	.....	21¼	22	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	Feb. 14	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	Feb. 14	100	98	100	
United States Gypsum Co. (common)	Feb. 14	20	95	97	40c quar. March 31
United States Gypsum Co. (preferred)	Feb. 14	100	116	116¼	1¾% quar. March 31
Universal Gypsum Co. (common)[3]	Feb. 14	No par	6	7	
Universal Gypsum V.T.C.[3]	Feb. 2	No par	6½	7	
Universal Gypsum Co. (preferred)[3]	Nov. 23	.....	73	77	1½% Feb. 15
Universal Gypsum and Lime Co. (1st 6's, 1946)[3]	Feb. 14	100	.....	96	
Union Rock Co. (7% serial gold bonds)[18]	Feb. 11	100	99	101½	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15]	Feb. 14	100	98½	100	
Wolverine Portland Cement Co.	Feb. 14	10	5½	6½	1½% Feb. 15

[1]Quotations by Watling, Lerchen & Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee, Higginson & Co., Boston and Chicago. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson Jr. Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y.

QUOTATIONS ON INACTIVE ROCK PRODUCTS CORPORATION SECURITIES ON PAGE 68

Editorial Comment

Care in Quarrying

Cleanliness and careful screening have been so much emphasized in preparing aggregate and road material that other details may have been forgotten. The production of crushed rock begins at the quarry face and it has been sometimes overlooked that the quality of the product may be lowered by badly placed holes and the use of too much powder. In Great Britain the subject of quality in road material is being intensively studied at the present time, and some quarrymen even contend that the type of crusher used affects the soundness and the shape of the product, which, in connection with blasting methods, opens a new field for investigation and research.

In this connection the following extracts from a paper read before the American Association of State Highway Officials by A. H. Hinkle, state superintendent of maintenance, Indiana State Highway Department, are most interesting and suggestive:

> This past year we built a penetration macadam road using stone from a local quarry. Although tests made by our laboratory on the stone indicated it was high quality, we were greatly embarrassed by finding that the stone crushed up badly under the roller. In fact, so badly that it was difficult to do the necessary rolling before the application of the bituminous material necessary to guarantee a good surface.
>
> As work progressed it was finally observed that stone secured later from this quarry offered a much greater resistance under the roller than that at first produced. We made as much of a study as we could conveniently, as to why the difference when the stone was apparently just the same and came from the same ledge. It was finally concluded that the bad results secured at first were likely due to the method of quarrying wherein an excess of improper grade of powder had been used in blasting, thus shattering the stone which later crushed badly under the roller. When careful and normal methods of blasting were developed the stone began to show improved results.
>
> I think, without doubt, our field men discovered the cause of the trouble. While the effects of improper blasting are more or less known among the quarrying profession, their study has been made more from the point of view of output than of the effect on the stone. This subject might be a fruitful one for some research work on the part of stone producers.

Rock Products in the Golden State

California used to be one of the largest contributors to the world's annual gold production — as probably everyone knows. It earned, and still carries, the title of the "Golden State." It is still an immensely wealthy state in mineral resources, the total value of its output in 1926 being $456,408,000; but of this $355,000,000 was for petroleum. California is still a considerable producer of gold—$11,700,000 in 1926; but the value of the precious metal produced in 1926 was considerably less than the value of sand, gravel and crushed stone produced in 1926—$17,500,000!

It should be of particular interest to all rock products producers that, in spite of the fact that California is yet one of the premier mining states, the total value of all the gold, silver, copper, lead, zinc, quicksilver (mercury) and platinum produced in 1926 was only $19,705,000 as against $17,500,000 for sand, gravel and crushed stone. If we add to the value of mineral aggregates the value of the 14,200,000 bbl. of portland cement ($27,000,000) the value of lime, magnesite, "celite," and other rock products, we have a total of $53,000,000, or nearly three times the value of the products of metallic mineral operations.

Incidentally, the foregoing statistics constitute an interesting commentary on the development of mineral resources. The gold, silver, mercury and other metals were just as valuable 50 years ago as they are today—of just as much economic importance, generally speaking. The sand and gravel excavated and cast away in the search for gold were then worse than useless. In a sparsely settled country in that day and generation they had no economic value. Today these accumulations of sand and gravel are being rapidly used up, and vast new excavations made, not for the gold they may contain, but for the crude materials themselves.

Population, automobiles and wealth to build roads and other structures have put a value into these crude materials undreamed of by the early gold miners, who doubtless treated them with the utmost contempt. And this same change is taking place throughout the United States, so that were it not for coal and petroleum, the value of these once despised "rock products" would loom very large indeed in all summations of our mineral wealth.

Building Codes

The legislatures of a generation ago had a passion for detail and drew specifications for conduct and procedure rather than to pass laws of general application. Some of the building codes of that date remain to vex us, even though they have been modified by legislation permitting the use of "equivalents." The state of Ohio had a very elaborate code drawn before the days when such building units as sand-lime brick, concrete block and certain gypsum products were much in use. Concrete block especially has had to put up a hard fight to be used as an equivalent of some other masonry units. The prospects are that the state will adopt a new short code this year defining only the characteristics of safe and sanitary construction and permitting a choice of methods and materials.

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend rate
Atlanta Shope Brick and Tile Co.[1]	Nov. 24	.....	25c	.....	
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29	.....	$400 for the lot	.....	
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	.....	12½	.....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	.....	70	.....	
Eastern Brick Corp. 7% cu. pfd.) (1)	Dec. 9	10	40c	.....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	.....	
Edison Portland Cement Co. (common)[4]	Sept. 11	50	20c	.....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	.....	
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Globe Phospate Co. ($10,000 1st mtg. bonds, $169.30 per $1000 paid on prin.)	Dec. 22	.....	$50 for the lot	.....	
Iroquois Sand & Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (2)	Mar. 17	.....	$12 for the lot	.....	
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22	.....	$60 for the lot	.....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	.....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	.....	.....	£1⅝	
Phosphate Mining Co. (1)	Nov. 24	.....	1	.....	
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.) (1)	June 23	.....	$200 for the lot		
Rockport Granite Co. (1st 6's, 1934)[2]	Aug. 31	.....	90	.....	
Simbroco Stone Co. (pfd.)	Dec. 12	.....	.....	.....	$2 Jan. 1
Southern Phosphate Corp.[6]	Sept. 15	.....	1¼	.....	
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22	.....	$6525 for the lot	.....	
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd. (6)	Nov. 3	.....	$1 for the lot	.....	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick) (5)	Dec. 16	.....	10c	.....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. (6) Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Penn-Dixie Cement Corp. Annual Report

PENNSYLVANIA-DIXIE CEMENT CORP. shows in its first annual report, covering the period ended December 31, 1926, combined profit after provision for depreciation and depletion of $5,195,083. After deducting interest charges on the full amount of bonds originally issued and Federal income taxes, $3,819,047 remained for preferred stock dividends, or 4.1 times the requirements for such dividends. The balance applicable to the common stock amounted to $2,909,047, or the equivalent of $7.27 per share.

In the letter to the stockholders of the corporation, Richard Hardy, chairman of the board, and John A. Miller, president, say:

"Since the consolidation of the properties in September, many economies in operation have been effected through the consolidation of offices, the centralization of buying, reduction of repair and operating supply stocks made possible through plant interchanges, and the transfer of proven economic practices in mill operation from one plant to another. Reserves for depreciation, obsolescence and depletion have been fully maintained and the physical properties are being constantly improved by installation of equipment designed to further reduce costs and to increase output."

PENNSYLVANIA-DIXIE CEMENT CORP. ANNUAL REPORT

(Corporation and subsidiary and predecessor companies)

Years ending December 31—	1923	1924	1925	1926
Net sales	$11,812,435	$12,804,004	$13,900,023	$14,712,450
Mfg. cost of sales (exclu. of deprec. and depl.) and all other expenses of oper., less misc. inc.*	7,585,754	8,107,618	8,197,425	8,501,273
Provision for depreciation and depletion	662,922	741,878	938,128	1,016,093
Profits from operation	$ 3,563,760	$ 3,954,508	$ 4,764,471	$ 5,195,084
Profits from operations for the year 1926 applicable to:				
Operations of predecessor companies from Jan. 1 to Sept. 23, 1926				$ 4,058,203
Operations of present companies from Sept. 23 to Dec. 31, 1926				1,136,881
Total as above				$ 5,195,084
Profit from operations (of Pennsylvania-Dixie Cement Corp. and subsidiaries) for period from Sept. 23, 1926, to Dec. 31, 1926, as shown above				1,136,881
Interest charges, $212,038; provision for Federal income taxes, $142,250				354,288
Dividends paid on preferred stock (to Dec. 15, 1926), $227,500; on common stock, $320,000				547,500
Balance, revenue surplus at Dec. 31, 1926				$ 235,093
Surplus at organization				2,555,886
Surplus at Dec. 31, 1926				$ 2,790,979
Earnings per share on 400,000 (no par) shares common stock				$1.39

*Exclusive of special compensation paid by predecessor companies but now discontinued.

Bessemer Limestone and Cement Bonds Offered

OTIS and Co., The Guardian Trust Co., Wick and Co., Chicago, Ill., are offering at 100 plus accrued interest to yield 6.50%, $2,500,000 first mortgage, 20 year 6½% gold bonds of the Bessemer Limestone and Cement Co., Bessemer, Penn. Dated February 1, 1927, to mature February 1, 1947. Redeemable as a whole or in part by lot on any interest paying date on sixty days' published notice at 105 and interest up to and including February 1, 1932; at 103½ and interest thereafter up to and including February 1, 1937; at 102½ and interest thereafter up to and including February 1, 1942; and at 101 and interest thereafter prior to maturity.

The following data are from a letter by L. A. Beeghly, president of the company, published in the underwriters circular describing the issue:

Business. The Bessemer Limestone & Cement Co., has been organized under the laws of the State of Delaware, to acquire the properties and business of a company of the same name incorporated under the laws of the State of Ohio in 1919. The business was originally established in 1888.

The company owns a large deposit of limestone at Bessemer, Pa., and its business originally consisted entirely of the production of fluxing-stone for the iron and steel industry and crushed stone for construction purposes. In 1920 the company erected a cement plant, which now has an annual capacity of 1,500,000 barrels, for the conversion of its limestone into cement, and at the present time slightly less than 50% of stone produced is used in its cement plant, the balance being sold largely as fluxing-stone to the steel companies operating open hearth and blast furnaces in this district. Limestone and shale are used by the company as the chief raw materials for its cement.

Limestone deposits owned or under lease by the company are estimated to contain over 50,000,000 tons, equivalent to about 60 years' supply at the present rate of consumption. The overburden contains shale which is used by the company in the manufacture of cement, and coal which is used for fuel for the company's locomotives, steam cranes, steam shovels, etc. Some shale is also sold for the manufacture of brick.

Security. This issue of bonds will be secured, in the opinion of counsel, by a first closed mortgage upon all the fixed assets of the company, appraised as of October 31, 1926, by Ford, Bacon & Davis, Inc., at a sound depreciated value of $5,326,702. The company's balance sheet as of October 31, 1926, adjusted to give effect to this financing, shows net tangible assets applicable to these bonds of $6,420,595, or $2,568 for each $1,000 bond.

Earnings. Net earnings of the predecessor company available for interest and Federal taxes, after allowance for depletion and depreciation, and after elimination of special charges of nonrecurring character (averaging about $32,000 per year), as taken from the certified accounts of Price, Waterhouse & Co., for the three years and 10 months ending October 31, 1926, and from the company's reports for the months of November and December, 1926, have been as follows:

1923	$772,129.36
1924	743,048.26
1925	745,644.55
1926	463,409.14

Average annual net earnings for the four-year period as given above were $681,057.83 or 4.19 times maximum annual interest requirements on this issue.

Sinking Fund. The indenture securing this issue of bonds will provide for a Sinking Fund which it is estimated will retire approximately 85% of this issue, prior to maturity.

Management. The executive officers of the company will include the writer and some of his associates who have for many years controlled the Standard Slag Co., which with its affiliated corporations, is the largest organization in the country dealing in slag. The writer with others, including both oper-

ating and executive officers of the company, is investing over $1,400,000 in cash in the Class "B" shares of the company. The company will continue in the operation of its properties the majority of those who have been in charge of their successful operation in the past.

[L. A. Beeghly, president of Standard Slag Co., has been named president of the company. Directors include: H. N. Snyder, Buffalo; Richard Inglis, Cleveland; W. G. Scheub, Toledo, and R. C. Steese, Philip Wick, E. E. Swartswelter, W. E. Bliss, Charles Schmutz, W. H. Kilcawley and Mr. Beeghly, all of Youngstown.—*New York Wall Street Journal.*]

The following is the consolidated balance sheet as of October 31, 1926, prepared from the accounts as audited by Price, Waterhouse & Co., but adjusted to give effect to the formation of the new company, to the acquisition of the assets subject to the liabilities of the predecessor company and to the financing incidental thereto.

CONSOLIDATED BALANCE OF THE BESSEMER LIMESTONE AND CEMENT CO.

ASSETS

Current		
Cash and marketable securities		$ 353,483.14
Notes and accounts receivable less reserves		329,060.38
Inventories of finished and semi-finished products, raw materials and supplies		628,201.16
		$1,310,744.68
Investments in other companies		8,950.00
Capital assets, as appraised Oct. 31, 1926, by Ford, Bacon & Davis, Inc.:		
Mineral resources	$ 625,000.00	
Plant sites, buildings, machinery, equipment, employees' dwellings, etc., at depreciated values	4,701,702.00	
		$5,326,702.00
Deferred Charges		
Prepaid insurance, taxes and royalties	$ 204,237.12	
Advance stripping	231,419.94	
		435,657.06
		$7,082,053.74

LIABILITIES

Current		
Accounts payable and accrued liabilities		$ 199,162.37
Customers' sack deposits		26,638.90
		225,801.27
First mortgage 6½% 20-year gold bonds		2,500,000.00
Capital Stock and Surplus		
Class "A" stock, no par value—50,000 shares	$1,500,000.00	
Class "B" stock, no par value—100,000 shares	2,000,000.00	
Initial surplus	856,252.47	
	4,356,252.47	
		$7,082,053.74

South Dakota State Cement Plant Annual Report

NET INCOME from the operations of the state cement plant during 1926 lacked $4,810.48 of being sufficient to equal the interest charges paid out by the state on cement plant bonds during the year, according to the quarterly report of the South Dakota state cement commission.

The total net income for the year was $97,889.52, according to the report, and interest upon cement plant bonds was $102,700. The income for the first six months of the year was $68,495.24, and for the last six months dropped to $29,394.28. A drop in price of 10 cents a barrel to meet competition from private companies is assigned as one of the reasons for the sharp drop in earnings during the last six months. The other reason is that most of the purchases of cement are made in the first six months.

The balance sheet as of December 31 shows the plant to have a physical value, upon a depreciated basis, of $2,387,170.63 on that date.

In his message to the legislature former Governor Gunderson recommended that the law governing the cement plant be changed so as to permit the plant to pay the interest charges upon cement plant bonds. The report just filed shows that the plant did not earn enough last year to pay the entire charges, but could have paid most of the charges.—*Sioux Falls (S. D.) Argus Leader.*

Ideal Cement to Reduce Preferred Stock

CHARLES BOETTCHER, president of the Ideal Cement Co., Denver, Colo., has notified the stockholders that the company intends retiring $2,000,000 of the outstanding preferred stock, and has invited stockholders to tender shares on or before February 25 for redemption at a price of less than $110 a share. If less than 20,000 shares are offered, the difference between the amount offered and 20,000 shares will be called by lot April 1. The most recent quotation received on the preferred stock from brokers is about $108 per share.

Wolverine Portland Annual Report

NET PROFIT of the Wolverine Portland Cement Co. for the year ended December 31, 1926, was $12,038 after all charges, equal to 12 cents a share on the 100,000 shares of $10 par capital stock outstanding during the year. Net for 1926 compares with $62,152 earned after all deductions in 1925, or the equivalent of 62 cents a share on the same capitalization.

A detailed comparison of the company's income account and balance sheet follows:

CONDENSED BALANCE SHEET AS OF DECEMBER 31, 1926

ASSETS

Current Assets.		
Cash	$261,358.63	
Marketable investments (at cost)	29,478.75	
Accounts and accrued interest receivable	50,067.31	
Inventories	241,985.22	
Total current assets		$ 582,889.91
Fixed Assets.		
Land, clay and marl deposits	$ 127,698.58	
Less: Reserve for depletion	57,295.51	
Plant and equipment	$1,207,556.20	
Less: Reserve for depreciation	636,825.45	
Total fixed assets		$ 641,133.82
Deferred and Other Assets		$ 26,575.12
Total assets		$1,250,598.85

LIABILITIES AND CAPITAL

Current Liabilities.		
Accounts payable	$18,588.76	
Provision for income taxes	1,997.12	
Total liabilities		$ 20,585.88
Capital.		
Capital stock outstanding	$1,000,000.00	
Surplus	192,345.11	
Fire insurance reserve	37,667.86	
Total capital		$1,230,012.97
Total liabilities and capital		$1,250,598.85

CONDENSED INCOME, PROFIT AND LOSS STATEMENT FOR THE YEAR ENDED DECEMBER 31, 1926

Net sales		$706,791.43
Cost of goods sold (exclusive of depreciation and depletion)		555,640.16
Gross profit (exclusive of depreciation and depletion)		$151,151.27
Depreciation	$74,942.23	
Depletion	4,689.51	
Total depreciation and depletion		$ 79,631.74
Gross profit		$ 71,519.53
Selling expenses	$42,660.68	
Administrative expenses	20,439.12	
Total expenses		$ 63,099.80
Operating profit		$ 8,419.73
Other income		5,615.81
Profit before income tax		$ 14,035.54
Provision for income tax		1,997.12
NET PROFITS FOR 1926		$ 12,038.42

ANALYSIS OF SURPLUS ACCOUNT

1926			
Jan. 1	Balance		$210,519.01
	Add: Profit for 1926 as shown above		12,038.42
	Total		$222,557.43
	Less: Dividends paid	$30,000.00	
	Adjustment of prior years' income taxes	212.32	30,212.32
Dec. 31	Balance		$192,345.11

The company's balance sheet shows a slight improvement in financial position, with net working capital totaling $562,304, as compared with $520,502 as of December 31, 1925.

United States Gypsum Co.'s Annual Report

INCREASING competion and price cutting will be important factors in the earnings position of the United States Cypsum Co. this year, the stockholders were told by Sewell Avery, president, at the recent annual meeting. Mr. Avery presented the annual report showing another year of large earnings, with a net equal to $11.35 a share on the common stock now outstanding and hinted that while a satisfactory year was anticipated for 1927, that earnings might decline.

Asked as to what proportion of the company's products the U. S. Gypsum Co. supplied the United States, Mr. Avery said that at best it was a guess but he imagined it was about 45%. He then told of the new plants that have been springing up around the country and the methods many of them are using to obtain business. He told of mill prices normally $8 a 1000 ft. on plaster

board being cut to $4, a scale which had to be adopted throughout the country by all companies and which left no profit. He cited a number of instances similar to this bearing on the increasing competition and the disorganization of the price level which might affect profits of the future.

Competition Telling

"I can tell," he said, "just what this has done to our company recently. In December our volume was 7% lower, our price 6% lower and our gross 18% less than a year ago, and this at a time when our efficiency of operation was at the highest point in our history. That was caused by competition and price cutting." He said that in the entire year 1926 there was an increase in the company's tonnage of 7% and that by the improvements and additions made in recent years which created greater efficiency the production cost was reduced by 6% or $1,000,000 to $1,250,000. This, following a 9% reduction in cost in 1925 is not reflected in last year's earnings, however, because sales expense had mounted considerably. Mr. Avery pointed to the expenditure of $6,123,000 for plant expansions and improvements last year, stated that a smaller expenditure had been authorized by directors for 1927 and said that the major purpose of these plant improvements is "to attain economy of production and improvement of quality."

Profits Reduced

Further comment on this competitive situation is contained in the printed annual report where Mr. Avery said:

"Competition has been increasingly active throughout the year, and indications point to a continuation of this condition. While the average price reduction approximates 4% on the company's sales generally considered, it is to be noted that the market in many sections have on some commodities met such reduction in price as to seriously reduce profits.

"This development has been experienced in the face of an active building demand, and indicates plainly a capacity in the industry in excess of such large demand. If the generally expected reduction in building proves a reality there seems little justification to expect any decrease of these competitive factors in the commodities affected.

"Decrease in manufacturing cost has been more than equal to the decline in price. This is a gratifying justification of past plant expenditures, as the major part of this cost reduction is the direct result of recent plant investments.

"An outstanding feature of the year's business has been the need of increased sales effort to maintain the position of our established products in the trade and to introduce and widen the use of our steadily growing newer commodities."

Patent Situation Explained

For the first time Mr. Avery also gave some information on the patent situation on covered edge wall board. He told the stockholders that the first patents were purchased by United States Gypsum in 1905 from a man named Sackett and although these patents now have only three years longer to run, the company has been in litigation on them for twelve years and until recently had not collected a cent. He said the big companies have now recognized the validity of the patents, although legal action was not yet concluded and that the Beaver Products Co. had paid damages and was licensed to continue manufacture on the patents. The damages are included in 1926 earnings, although not designated, and the license agreement calls for a payment of 5% on selling price to U. S. Gypsum. The Universal Gypsum Co. also has made a similar agreement. "The rest of the industry," Mr. Avery said, "is ready to recognize the patents but reluctant to pay us. We are now recieving several hundred dollars a day on these patents and I hope before long it will be double."

Stockholders questioned Mr. Avery as to the possibility of larger cash dividend rather than the stock distributions which the company has made a definite policy in recent years. He would not give any definite information on the policies, but pointing to the 35% stock dividend of last fall said that he felt an increase of 35% in the income on stock holding was pretty fair treatment of stockholders and that he was well satisfied with such a policy.

Capitalization Increased

Following his remarks the stockholders re-elected all directors and ratified an increase in authorized capital of $10,000,000. The latest stock dividend had used up all authorized stock, and the fact that the directors requested an increase is accepted as indicating a purpose to continue the payments in stock.

After the meeting the directors declared the regular quarterly dividend of 1¾% on the preferred and 2% on the common stock, payable March 31 to stockholders of record March 15.

The company's annual report reveals the highest net earnings in the company's history, amounting to $10,763,219, against $10,474,302 the preceding year. Net income of $8,375,747 equalled $11.35 a share on $13,757,000 common stock, against $8,414,116 or $15.45 a share on $10,138,300 common stock in 1925. The net working capital decreased somewhat, but the company still has an exceptionally strong position, with a current asset ratio of better than 5 to 1.

Details of the financial results for the year are contained in the following four-year comparison of the statements of the company:

U. S. GYPSUM CO. BALANCE SHEET AND INCOME ACCOUNT, 1923-1926, INCLUSIVE

Income Account

Year ended December 31—	1926	1925	1924	1923
Net earnings after deducting all expenses incident to operations, including repairs and maintenance of plants	$10,763,219	$10,474,302	$ 8,825,697	$ 6,848,941
Contingent reserve	.....	.....	.....	500,000
Depreciation and depletion	1,063,379	848,007	670,590	553,323
Federal taxes	1,324,092	1,212,177	988,725	746,696
Net income for the year	$ 8,375,747	$ 8,414 116	$ 7,166,381	$ 5,030,922
Preferred dividends	567,563	579,925	592,077	421,178
Common dividends	6,116,088	3,790,002	4,292,515	1,180,490
Surplus for the year	1,692,095	4,044,189	2,281,789	3,429,253
Surplus paid in on capital stock	322,915	150,101	1,301,344	.....
Surplus at beginning of year	16,789,971	12,595,680	*9,012,547	5,615,795
Surplus at end of year	$18,804,981	$16,789,971	$12,595,680	$ 9,045,048
†Earned a share on common	$11.35	$15.45	$14.96	$15.59

*After adjustments. †On $13,757,500 common stock in 1926, $10,138,300 in 1925, $8,786,960 in 1924 and $5,911,680 in 1923.

Balance Sheet—Assets

	1926	1925	1924	1923
Plant and property	$28,643,706	$22,520,159	$18,626,091	$10,964,563
Gypsum and gypsite	5,727,500	5,727,500	5,815,500	5,815,500
Treasury holdings	127,814	119,118	127,087	14,850
Deferred charges	463,956	238,682	162,341	131,852
Current Assets—				
Cash on hand and in banks	1,123,703	899,270	1,277,287	477,570
Marketable securities	5,647,006	6,515,129	4,551,928	3,513,926
Accounts and notes receivable	4,567,001	4,628,331	3,885,913	3,197,713
Erection and contract advances	838,053	680,457	445,414	687,754
Inventories	3,754,122	3,319,318	3,107,081	2,004,395
Total current assets	15,929,887	16,042,507	13,267,625	9,881,361
Total assets	$50,892,864	$44,647,967	$37,998,646	$26,808,127

Liabilities

Common stock	$13,757,500	$10,138,300	$ 8,786,960	$ 5,911,680
Preferred stock	8,441,600	8,741,600	9,032,900	6,020,300
Reserves	6,820,045	6,097,065	5,315,276	3,904,758
Surplus	18,804,981	16,789,971	12,595,680	9,012,547
Current Liabilities—				
Accounts payable, including dividends	1,210,554	1,183,038	1,126,980	1,059,523
Taxes, interest, etc., accrued	1,858,182	1,697,991	1,140,848	899,318
Total current liabilities	3,068,737	2,881,030	2,267,829	1,958,841
Total liabilities	$50,892,864	$44,647,967	$37,998,646	$26,808,127
Net working capital	12,861,150	13,161,476	10,999,796	7,922,519

—Chicago Journal of Commerce.

Sand-Lime Brick Production and Shipments in January

THE following data are compiled from reports received direct from 28 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is five more than those furnishing statistics for the December estimate published in the January 22 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having over two-thirds the production capacity in the United States and Canada.

Production and shipments fell off considerably in comparison with the preceding months, due to the general slackening of building operations during the winter months and many plants overhauling their equipment at this time. Stocks and unfilled orders showed a large increase. Prices remained about the same as last month.

Several producers are decidedly pessimistic about the building activities for the coming year and expect a decided decline over last year's record. In contrast to these, other producers in different localities are enjoying good business and have a good volume of orders booked for spring delivery. Production will be sped up towards capacity output within the next few months, at most of the plants, to fill orders and as a reserve for anticipated demand for sand-lime brick.

The following are the average prices received in December:

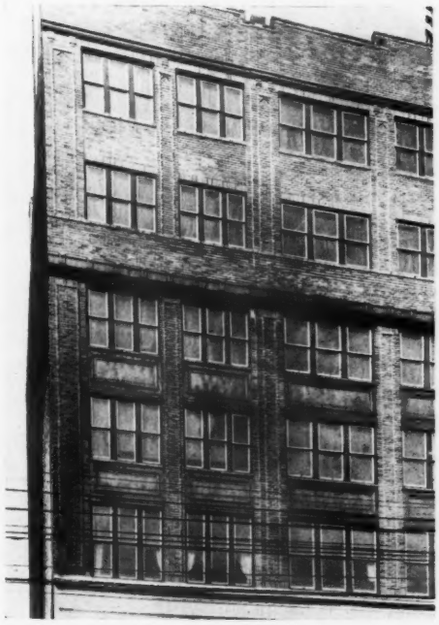
Shipping Point	Plant Price	Delivered
Detroit, Mich.	.....	17.50
Dayton, Ohio	12.50	.....
Syracuse, N. Y.	18.00	20.00
Michigan City, Ind.	11.00	.....
Menominee, Mich.	11.00@12.00	.....
Grand Rapids, Mich.	12.00	.....
Detroit, Mich.	.....	16.50
Toronto, Ont.	13.10	15.60
Atlantic City, N. J.	14.00	.....
Albany, Ga.	10.60	13.50
Detroit, Mich.	12.00	16.50
Jackson, Mich.	12.25	.....
Hummelstown, Penn.	11.00	.....
Rochester, N. Y.	.....	19.75
Detroit, Mich.	.....	16.68
Milwaukee, Wis.	10.50	13.00
Toronto, Ont.	12.60	15.60
Lake Helen, Fla.	11.00@15.00	.....
Saginaw, Mich.	12.00	.....
Lakeland, Fla.	10.00	15.00
San Antonio, Tex.	.....	13.00
Buffalo, N. Y.	12.20	15.65
Winnipeg, Man.	.....	14.00
Minneapolis, Minn.	10.00	12.75@16.50
Woburn, Mass.	13.50	.....

The following statistics are compiled from data received direct from 28 producers of sand-lime brick:

Statistics for December, 1926, and January, 1927

	December*	January
Production	12,049,000	8,307,000
Shipments (rail)	3,825,000	3,824,000
Shipments (truck)	7,401,000	5,378,000
Stocks	11,583,000	16,455,000
Unfilled orders	7,701,000	†17,908,000

*23 plants reporting.
†Incomplete, 7 plants not reporting this data.



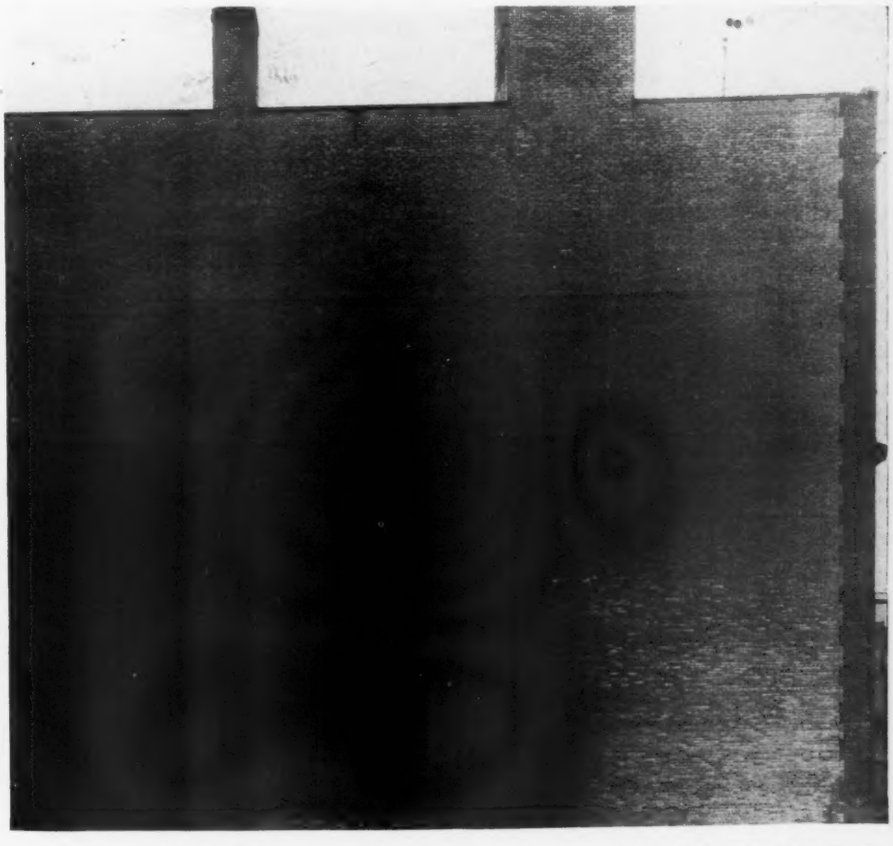
Corner view of wall showing it to be in perfect condition after exposure to intense heat for about five hours. The adjacent building was completely destroyed

The Albany Brick Co., who recently purchased the Silica Brick Co., Albany, Ga., has completed the changes at that plant and started operations. Interesting evidence of the fire-resisting qualities of sand-lime brick is given in the following sent by the Atlas White Brick Co., Atlantic City, N. J.

During a recent fire in a meat market at Atlantic City, a fire-wall of an adjoining building (Kensington Carpet Co.'s store) was exposed to the intense heat of the fire.

The fire broke out early in the morning, and there was a very high wind sweeping against this fire-wall, due to the meat and fats in the meat market, which naturally produced a terrific heat. The fire continued and burned back to a depth of possibly 200 ft. This wall was exposed to the greatest heat for about five or six hours. The other buildings were burned clear down to the ground, and when the fire was over and the lots cleaned up this fire-wall proved to be in A-1 condition, as is shown by the photographs. You will note in the right hand corner showing the fire-wall there are a few white spots. That does not mean that the brick deteriorated,—that is where the wind fanned the fire in such a way that these brick were not exposed to much smoke, and therefore retained their natural white color. The building is seven stories high and you may judge from the photographs that the wind carried the fire and heat to the top.

The second illustration is that of a corner view of the same wall, showing that the wall is intact and in perfect condition. This fire wall was constructed in white sand-lime brick, manufactured by the Atlas White Brick Co. In view of these facts it is needless to say from a fire-resisting standpoint, sand-lime brick will stand as much heat as any material on the market, except fire brick or fire clay.



The sand-lime brick fire wall of the Kensington Carpet Co., Atlantic City, N. J., after being subjected to intense heat from a nearby fire for over five hours

Detroit Convention of the Sand-Lime Brick Association

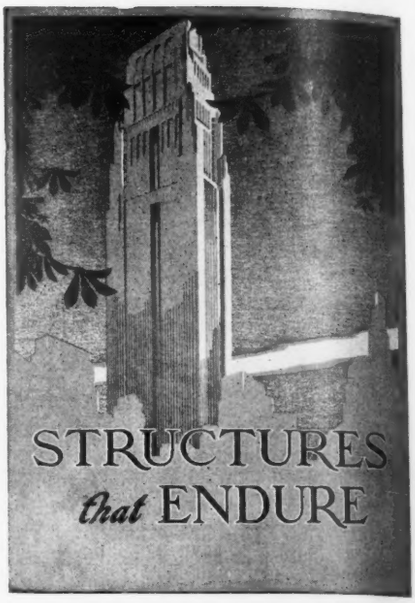
Continuation of Report of Proceedings from Page 78, Rock Products, February 5

MOST of the high points in the proceedings of the Sand-Lime Brick Association's convention at Detroit, Mich., February 1 to 3, were covered in the report published in ROCK PRODUCTS, February 5, pp. 76-78. Various interesting features of plant operation were brought up and discussed at odd times during the convention, and these will be briefly referred to here.

Improved Methods of Handling Brick

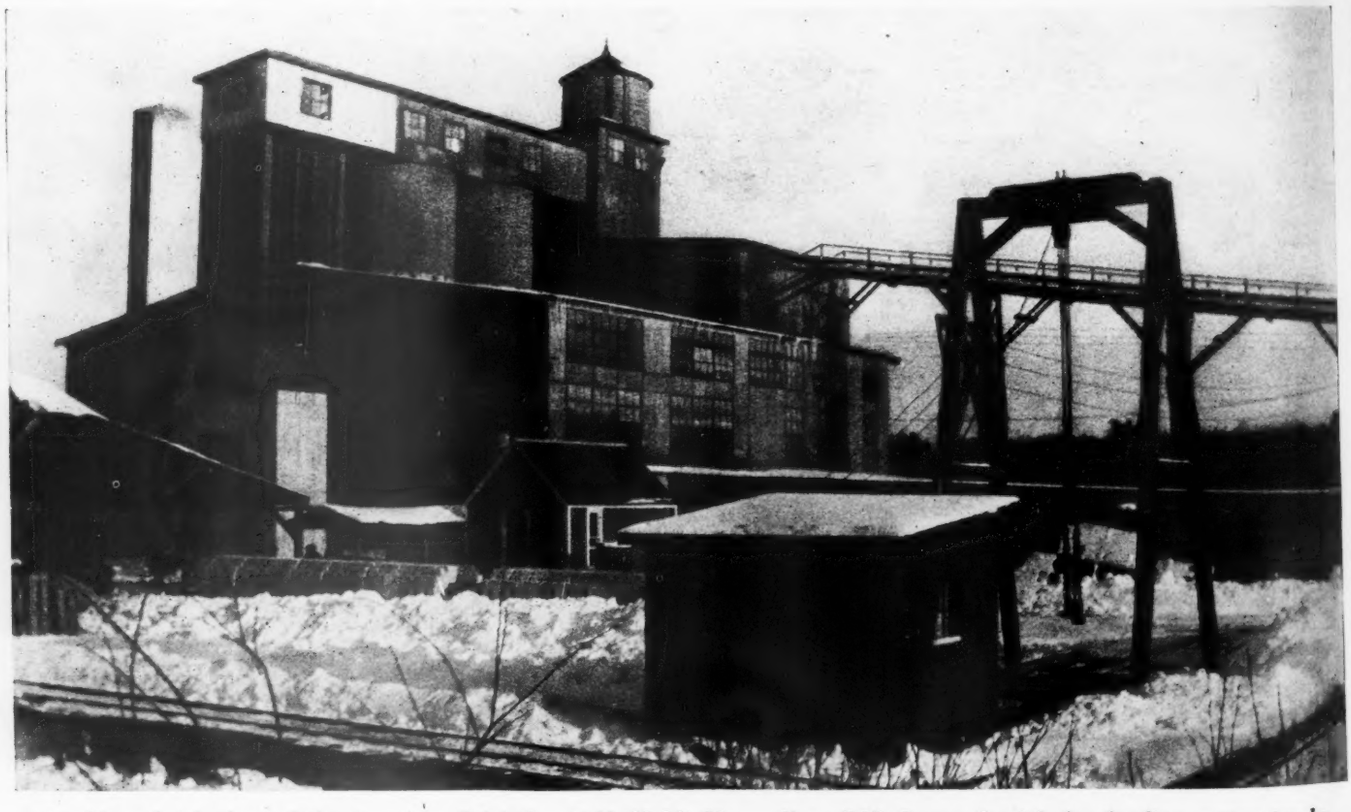
C. H. Carmichael, American Brick Co., Boston, Mass., said he had been experimenting for two years with a device to handle brick mechanically from the hardening cylinders to stock pile and motor trucks. After a quite thorough investigation he bought an English machine, marketed in this country by R. S. Lackey, Buena Vista, Va. This device, a special type of grab, is illustrated herewith. It is manufactured by Sutcliffe, Sparkman & Co., Lancashire, England, but is of German origin and similar to one manufactured by the Komnick Machinery Co., whose American address is Detroit, Mich.

The grab is built of a pair of tongues, or gripping jaws. These jaws are provided throughout their length with spring loaded fingers which automatically adjust themselves to any inequalities in the size of the bricks. These jaws, through suitable levers, cranks and compensating rods, are caused to move together at an equal rate of speed. By means of two pins on a sliding bracket the gripping jaws are locked open. The grab is then lifted by a crane and lowered to a car or truck load of brick. Adjustable locating stops are provided, which are set to such a height that when they rest on the top row of bricks the bottom of the gripping jaws is just clear of the car body. The locking device is then withdrawn and the crane set in motion. As the crane lifts, the cranks and levers, referred to, cause the two jaws to move inwards against the bottom row of bricks. The continued movement of the jaws first closes up the several rows of bricks, after which they continue to close until the grip exerted overcomes the weight of the load. Any further lifting by the crane lifts the pile of brick, the lower layer of brick acting as a platform. When the load is deposited in a motor truck, or elsewhere, and the crane is lowered off, the jaws automatically open and the locking device is again inserted; after which the grab can be lifted clear of its load. The price of the device delivered at Boston was $1275.



Cover of an attractive booklet recently brought out by the Sand-Lime Brick Association

Mr. Carmichael said it was necessary to make sure that all loose material was cleared from between the bottom rows of brick, a special brush or broom being used for this purpose. At his plant the grab is handled now by an A-frame derrick, the cars from the hardening cylinder being run out under the derrick, while motor trucks are backed partially under it, from a driveway at right



Sand-lime brick plant of the American Brick Co. at Medfield, Mass. Note "A" frame derrick for loading motor trucks

angles to the car tracks. Two men can load a motor truck in from 4 to 5 minutes. It is intended to replace the A-frame derrick with a traveling overhead crane, which will span the parallel tracks from all the hardening cylinders.

Removing Scale from Kiln Cars

G. H. Nichols, Grande Brick Co., Grande Rapids, Mich., described his experiences in ridding kiln cars of scale. Formerly he said there was 5% breakage and poor brick, which were traced to scale on the platforms or decks of the cars. He tried all kinds of devices for getting rid of scale, finally using a portable grinder, driven by a 2-hp. electric motor. The motor and grinding wheel or disk (cup-shaped) are mounted on a vertical shaft, the whole riding on a two-wheel truck. One man can grind off the scale on a string of cars in from 15 to 45 minutes, depending on the amount of scale. This portable grinder is made by the Jackson & Church Co., Saginaw, Mich., weighs 450 lb. and sells for $250 f.o.b. factory.

Better Plant Details

Another instance of improvement in plant details was mentioned by R. C. Kiser, of the Crume Brick Co., Dayton, Ohio, who said he had adopted the Allis-Chalmers Manufacturing Co.'s new "Texrope" drive for his rod mills with very satisfactory results. This plant is crushing and grinding gravel from about 1½ in. down to make sand for brick.

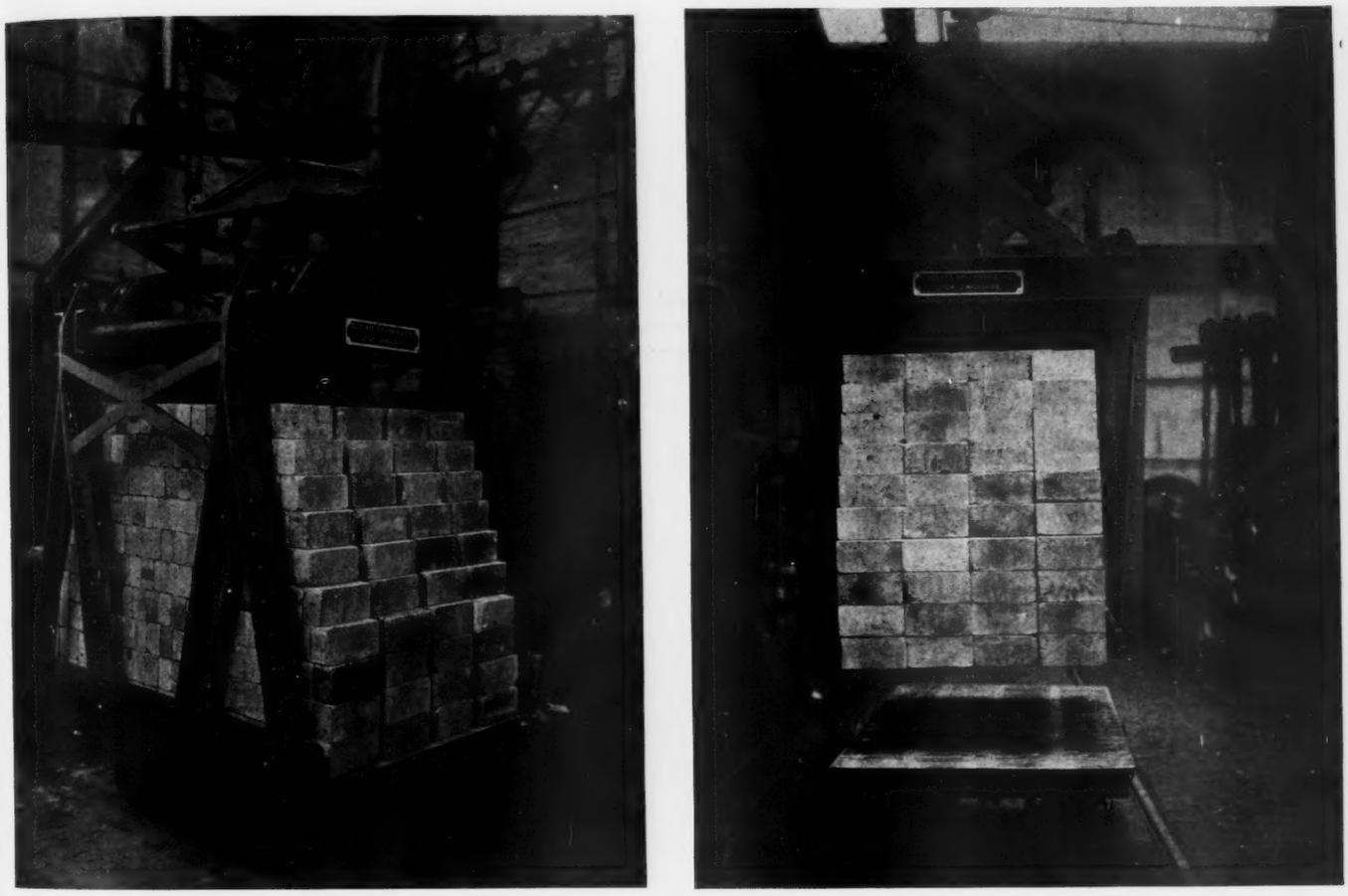
J. Kennedy Hill, of the Simonds-Canada Saw Co., said that his company had been supplying liner plates for brick presses, made of special steel, for several years. They had long been used in the sand-lime brick plants around Toronto, but did not seem to be known elsewhere. Until 1914 these liner plates were made of high carbon steel, since then of a special alloy tool steel, now made in electric furnaces. These special steel liner plates save many replacements and by their slower wear save oversize brick from being such a frequent occurrence.

A Mr. Munn, representing the Coal Burning Engineering Co., Detroit, Mich., described the use of automatic underfeed stokers for firing boilers at sand-lime brick plants. One such installation, at the plant of the Sand-Lime Products Co., Detroit, was described and illustrated in Rock Products, January 22, p. 96. Mr. Munn said that his company guaranteed a saving of 15% in the quantity of coal burned—a saving in one instance of a sand-lime brick operation of $4100 in one year. In addition there are other advantages in the way of a more uniform steam pressure, which in sand-lime brick manufacture is quite desirable.

Numerous other improvements and refinements have been made in boiler operation at sand-lime plants recently, such as condensers for the recovery and use of steam from the hardening cylinders, instead of exhausting it into the atmosphere, feed water heaters and economizers, etc.

Florida Hurricane Facts

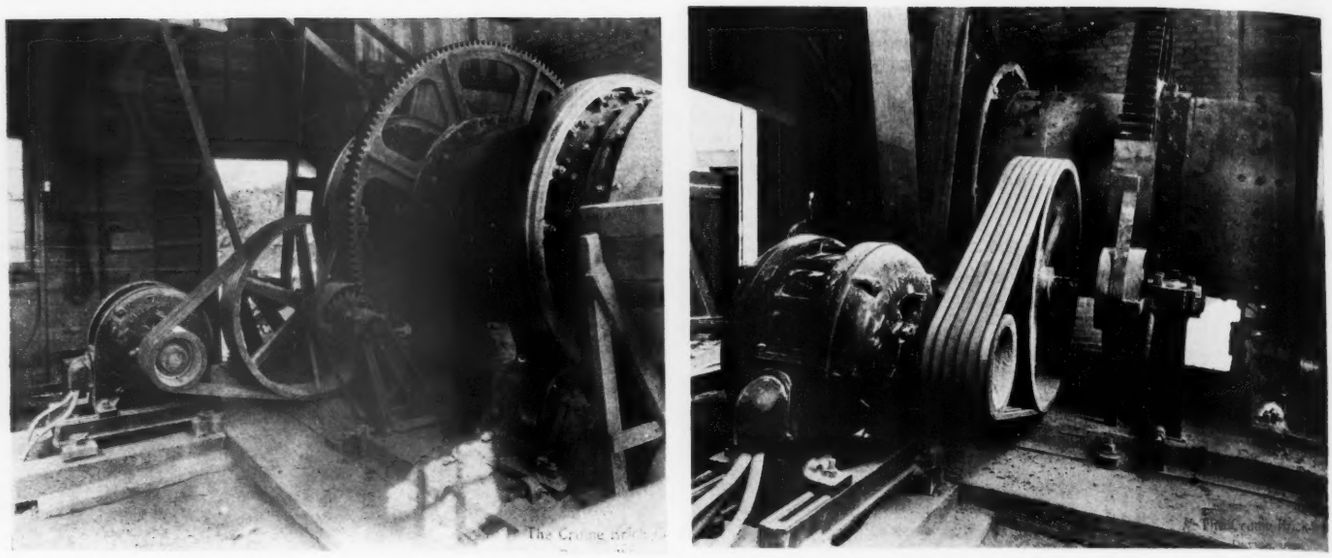
One very interesting paper read at the convention was that of R. Roy Hall, De Soto City Brick Co., De Soto, Fla., who at the request of President John L. Jackson, made an exhaustive investigation and report on alleged failures of sand-lime brick in the Florida hurricane of last fall. This report was abstracted in Rock Products, January 22, p. 96, and refuted absolutely propaganda put forth by the clay brick interests that the failure of the brick walls of the Meyer-Kiser building at Miami was due to their being made of sand-lime brick, for the quite adequate reason that the walls were not of sand-lime brick at all but of *clay* brick. (Another boomerang for the knocking clay brick manufacturers!)



Illustrating the mechanical "grab" for handling brick from hardening cylinders to stock piles or trucks

Officers Re-elected

All of the officers were re-elected with the exception of the secretary, G. W. Phelps, who pleaded ill health, as follows: President, John L. Jackson, Saginaw, Mich.; vice-president, W. A. Smyth, Toronto, Ont.; treasurer, Allen G. Walton, Hummelstown, Penn. The members of the executive committee are: Wm. H. Crume, Dayton, Ohio;



Special form of short center rope drive used to drive the rod mills at the Crume Brick Co., Dayton, Ohio

Dr. A. S. Wolfe, Washington, D. C.; Otto Schwartz, New Orleans, La.; W. H. McFarlane, Winnipeg, Man.; J. G. Schluchter, Detroit, Mich.; E. W. Smythe, Madison, Wis.; C. H. Carmichael, Boston, Mass.

Miss Ellen Knight, who has served so efficiently as assistant secretary for several years, was elected secretary, with a suitable salary. Hitherto the secretary has been a manufacturer.

The next convention will be held in Washington, D. C., the time and hotel to be announced later.

Lime Plasticimeter Base Plates Developed at Bureau of Standards

THE Emley plasticimeter, devoloped at the U. S. Bureau of Standards, affords a convenient method for measuring the plasticity of lime. In using this instrument a specimen of lime putty is placed on an absorptive base plate, the plate and specimen then being turned at a uniform rate and raised against a smooth steel plate. The base plate corresponds to the scratch and brown coats of plaster and the steel plate to the plasterer's trowel. The torque which the specimen exerts on the steel plate and the time elapsing between the beginning of the test and the development of the maximum torque are measured. These two quantities are used to calculate the "plasticity figure" of the lime.

When determinations of the "plasticity figure" made at the bureau did not check with those made on the same lime at the plant an inquiry into the possible causes of the discrepancy was made. The uniformity of the base plates was the first matter to be considered, and the results obtained indicate that therein lies the possibility of much inconsistency. The only requirement at present demanded of the plates is that they absorb between 20 and 25% of their weight of water when immersed for two hours. Although this requirement is met by all the plates which have been tested, the rate of absorption differs markedly. There are distinct types of plates, the rate of absorption of those of the same type being almost identical, while there is great variance among different types. As a specific example, plates of one type absorbed as much water in four minutes as those of another type absorbed in 80 minutes, the absorption being expressed as per cent of the weight of the plate. It follows that the time required for the specimen to exert its maximum torque would be much less with plates of the former type and the resulting "plasticity figure" much lower than with plates of the latter type.

The minor amount of work completed indicates that further consideration should be given to the specifications for the base plates with regard to embodying a "rate of absorption" requirement, and it is proposed to make such a recommendation to the lime committees of the American Society for Testing Materials and the Federal Specifications Board.—*Technical News Bulletin,* of the U. S. Bureau of Standards.

Sand-Lime Brick Used for Paving

SAND-LIME brick are used for street paving in Marienbourg, East Prussia, Germany, according to an article by G. Wegner in the *Revue des Materiaux de Construction.* The bricks are made in the ordinary way and afterward impregnated with a bituminous material. The impregnation is carried on in a special "stove" hermetically sealed, the bituminous mixture being prepared in a second stove and forced in under pressure. This is one of the processes of Komnick, the German manufacturer of sand-lime brick and brick machinery.

The brick are said to contain 14.5% of bituminous material uniformly distributed through the brick. The impregnation raises the compressive strength from 170-210 kg. per cm. to more than 230-270 kg. per cm. (3260-3850 lb. per sq. in), the latter pressures neither breaking nor deforming the samples. It also prevents powdering of the brick. Trial stretches of this pavement are said to have given good service in the three years they have been in use and they are much less noisy than other sorts of paving.

Census of Marble, Slate and Cut Stone Manufacturers in 1925

THE Department of Commerce announces that according to data collected at the biennial census of manufactures taken in 1926, the establishments engaged primarily in the manufacture of marble, slate, and other stone products reported, for 1925, the production of monuments, tombstones, and other memorials, valued at $65,009,614; roofing slate, $4,273,536; other stone work (principally building stone of marble, granite, and Indiana limestone), $120,998,487; and miscellaneous products valued at $2,765,199; making a total of $193,046,836, an increase of eight-tenths of 1% as compared with $191,537,444 for 1923, the last preceding census year.

The principal products of this industry are monuments, tombstones, and other marble and stone articles for cemetery uses; builders' and plumbers' marble and stone work, soapstone work, and other marble and stone work except grindstones, pulpstones, and hones and whetstones; and roofing slate, slate blackboards, and other slate work. The census does not cover the numerous small yards where finished or partly finished monuments or tombstones are sold and where the only work performed is lettering or finishing done to the individual order.

Carl Leonardt

CARL LEONARDT, one of the outstanding figures of the portland cement industry, died at Los Angeles Monday, February 14, as the result of an operation. The news came as something of a shock to his friends and acquaintances, as Mr. Leonardt had been though to have many years of useful life before him.

He was president of the Southwestern Portland Cement Co. of Los Angeles, with plants at Victorville, Calif., El Paso, Texas, and Osborne, Ohio. The growth of this company under his direction is one of the remarkable instances of the growth of a cement business in the United States. The Victorville plant was the first to be built and in 1917 when it began operations it produced only 1000 bbl. per day. By 1924 the production had risen to 5000 bbl. per day. Afterward the El Paso and Osborne plants were built (the latter in 1925) and the combined production raised the figure to around 15,000 bbl. per day. Mr. Leonardt was active in the affairs of all these plants so that much of this growth must be laid to his forceful personality.

Mr. Leonardt was born in Ludenscheid, in Germany, but passed practically all his life in America. However, his was the international type of mind that concerns itself with whatever is going on in all civilized countries. He visited Europe frequently and wherever he could find a better mthod or a better machine than he had seen before he was quick to adopt its use to his own production problems. His plants were all noteworthy for the way in which they kept abreast or a little ahead of the current developments in cement making, and the great business he founded and brought to maturity is a worthy monument to his memory for that reason as well as for others.

During the meeting of the Portland Cement Association in Los Angeles in May, 1924, Mr. Leonardt entertained the members attending at the Victorville plant.

An Australian Crushed Stone Operation

THE Sydney and Suburban Blue Metal Quarries, Ltd., Sydney, Australia, crushes basalt or "blue metal" for road and building construction. J. L. Purves is manager of the company, and has supplied the following information:

"Our quarry is operating 23 miles from the city of Sydney, and at present the output is approximately 250 to 300 tons per day, but will be increased to 600 tons per day as soon as the quarry face is sufficiently developed. A lot of dead work was required to open up this quarry in the form of a cut into the side of a hill, which passed through decomposed metal to the extent of about 80 ft. The present face is 78 ft. high and 100 ft. wide (in solid metal). This is being widened as rapidly as possible.

"The crushers installed are of Traylor Engineering and Manufacturing Co. manufacture: a 42x48-in. jaw crusher for the primary crusher and a 10x72-in. jaw crusher for the secondary. The oversize from the secondary is crushed to ¾ in. in a 24-in. Hadfield disc crusher, and the whole crusher run-in conveyed on a 20-in. Goodyear belt of 1000-ft. centers to the sizing screen and bins, situated over the railway siding, into 1½-yd. side-tipping trucks by a No. 10 Ruston and Hornsby steam shovel, and these trucks move by gravity to the crusher, where they are tipped onto an apron feeder.

"I am most interested in the transport of quarry run to crusher, and the handling of the screened products into bins and railway trucks."

New Phoenix Mill About to Start Operations

PRELIMINARY tests on machinery and equipment at the new cement mill recently completed near Powderley, Ala., by the Phoenix Portland Cement Corp., are reported to have been made and the plant expected to go into production within a short time. The capacity of the plant will be about 1,300,000 bbl. annually from two 11 ft. 3 in. x 330 ft. kilns, the wet process being used. Lindley C. Norton is the president of the company.

The Gypsum Industry in Western Canada

THE gypsum industry in Western Canada has been showing steady improvement during the past year and a half, a development not entirely unexpected in view of increasing activity in the building trades.

During the year 1925 the business of the Manitoba Gypsum Co., which operates quarries 100 miles north of Winnipeg, increased 20% over that of the previous year, and the indications for 1926, judging from the first six months, bid fair to show a similar advance. The demand for plaster board, gypsum blocks, and other specialized gypsum products, is steadily increasing and the operating companies are increasing their production to meet requirements.

In British Columbia operations have been started on two properties since January of this year. At Mayook, 11 miles east of Cranbrook, on the Crow's Nest line of the Canadian Pacific Railway, the Canada Cement Co. have opened up a gypsum quarry and are shipping from two to three cars a week to Exshaw, Alberta, where the gypsum is being employed in the manufacture of cement.

At Falkland, on the Canadian National Railway, 40 miles southeast of Kamloops, the British Columbia Gypsum Co. are operating a gypsum quarry and shipping the rock to their mill at Port Mann, B. C. Small shipments are also being made to the British Columbia Cement Co. for use in cement manufacture. The production from this quarry is averaging 100 tons per day. The mill of the British Columbia Gypsum Co. is equipped to calcine and prepare all grades of gypsum plasters, as well as to manufacture plaster board.

1927 Safety Congress To Be Held in Chicago

FOR the first time in years the annual convention of the National Safety Congress will be held in a hotel large enough to house under one roof its several thousand delegates, its hundreds of exhibits and its scores of sessions.

The sixteenth annual safety congress will be held at the Stevens hotel, in Chicago, from September 26 to 30, inclusive, next year, states an announcement made by W. H. Cameron, managing director of the National Safety Council, following a meeting of its executive committee.

"During the past several years, it has been impossible to accommodate our congress in one single hotel," stated Mr. Cameron. "At Detroit this year it was necessary to utilize four different hotels in which to hold our 90 different sessions, which were addressed by 300 speakers. We are going to have the first four floors of the new Stevens hotel devoted to our convention next year and will be able to have all of our members, meetings, banquets, luncheons, conferences and exhibits under one roof.

The National Safety Council has its headquarters in Chicago and is the parent organization of the Chicago Safety Council and sixty-five other affiliated community accident prevention associations.

Western Company Acquires Roofing Tile Concern

THE Western Concrete Products Co. of Denver, Colo., it is reported, has acquired the Heinz Roofing Tile Co., also of Denver. The plants will not be merged, according to present plans, but the manufacture of roofing tile will be continued in the Heinz plant independently of the Western company's present concrete products business.

A bond issue of $80,000 and $80,000 preferred stock passed in the transfer, it is stated.

The Western company was started in 1922. The Heinz concern was established 14 years ago, with George P. Heinz president. In giving up the tile business, the George P. Heinz Co. will continue its building supplies specialties.

J. E. Zahn is president of the Western Concrete Products Co.; James M. Patterson, vice-president, and A. A. Matthews, vice-president. Fred R. Schmidt, a director of the Western company, is said to have been elected president and treasurer of the new concern, with Raymond Sollis, vice-president, and Adolph Kunsmiller, secretary and assistant treasurer. There will be no change in the Western officials.

Ship Kiln Section for Yosemite Portland Cement Mill

THE first section of one of the two large new kilns to be installed at the Yosemite Portland Cement Co's mill at Merced, Calif., was shipped recently by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The kiln was shipped in three sections. The feed end section was 10 ft. in diameter and 82 ft. 6 in. long and was shipped on two cars. The center section was 10 ft. in diameter, 73 ft. 6 in. long and was shipped on two cars; and the discharge section was 10 ft. in diameter and 82 ft. 9 in. long and was also shipped on two cars. These three sections will make one of two 10x240 ft. kiln shells.

This new 2500-bbl. cement mill is expected to start manufacturing about April 20, according to George A. Fisher, who is erecting the plant. Limestone is to be obtained from a large deposit near Jenkins Station on the Yosemite Valley Railway, where quarrying equipment is being installed to handle the rock.

Foundations are in for the kiln and other heavy machinery and a 60,000-bbl. silo for storage of cement has been completed. Work is progressing rapidly on two concrete stacks each to be 200 ft. high. The stacks will be illuminated by flood lights making them visible at night for many miles away. Two feed silos for storage of rock are built adjoining two inclines for elevating loaded cars 20 ft. above the ground level to facilitate dumping and handling rock by means of automatic conveyors.

Twelve oil storage tanks each with a capacity of 400 bbl. have been installed for fuel oil to be used in the plant.

The new cement plant is a San Joaquin Valley enterprise owned by San Joaquin Valley people with the San Joaquin Valley as an immediate market. A. Emory Wishon, vice-president and general manager of the San Joaquin Light and Power Corporation, is president of the Yosemite-Portland Cement Company. Other members of the board of directors are W. A. Sutherland, vice-president, Pacific Southwest Trust and Savings Bank; Murray Bourne, general counsel, San Joaquin Light and Power Corp., and John B. Olcese, Bank of Italy, Bakersfield.

A Study of Portland Cement Strength Characteristics

A STUDY made of 8109 samples of portland cement, tested in the road materials laboratory of the Kansas State Agricultural College, is interesting both to makers and users of cement as illustrating the results obtained in routine testing. Eight brands made in three states were tested and no brand was represented by less than 600 samples. The report has been issued as Bulletin No. 17 of the Engineering Experiment Station and is published by the college, which is at Manhattan, Kan.

The points shown by the test are: The range of strength at seven days for tensile tests, and the same range for 28 days; the rate of increase in strength from seven to 28 days; the preceding items for individual brands as compared to the average for all. Data of comparison between the work of one operator for a few months with the work of a number of operators, or samples of the same cement extending over a period of several years are also given.

Tests were made in the usual way (A. S. T. M. recommendations being followed) on briquettes for tensile strength. In addition 2x4-in. cylinders were made from 674 samples and tested for compressive strength. Some slight departures were made from A. S. T. M. recommendations in making these cylinders on account of their size; otherwise the recommendations were followed.

The conclusions drawn are:

(1) Commercial grades of portland cement are fairly uniform in their tensile strength characteristics both as regards samples taken over a long time and also as between the several different brands of portland cement used in the tests.

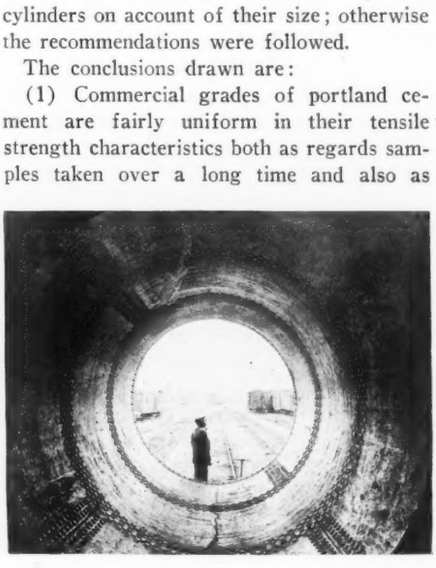
(2) There is very good correspondence between the 7-day strength and the 28-day strength in both tension and compression. The correlation seems to be about the same for the several brands of cement tested.

(3) The relation between tensile strength and compressive strength is not close, indicating that the two properties are distinct and that excellence in one quality does not necessarily indicate a correspondingly high degree of excellence in the other quality.

(4) That tests for tensile strength give very consistent results, while tests for compressive strength are more variable, both as between separate samples tested by the same operator and the work of different operators. This may indicate the advisability of making a larger number of tests in compression before accepting or rejecting a sample than are necessary in the standard tensile strength test.

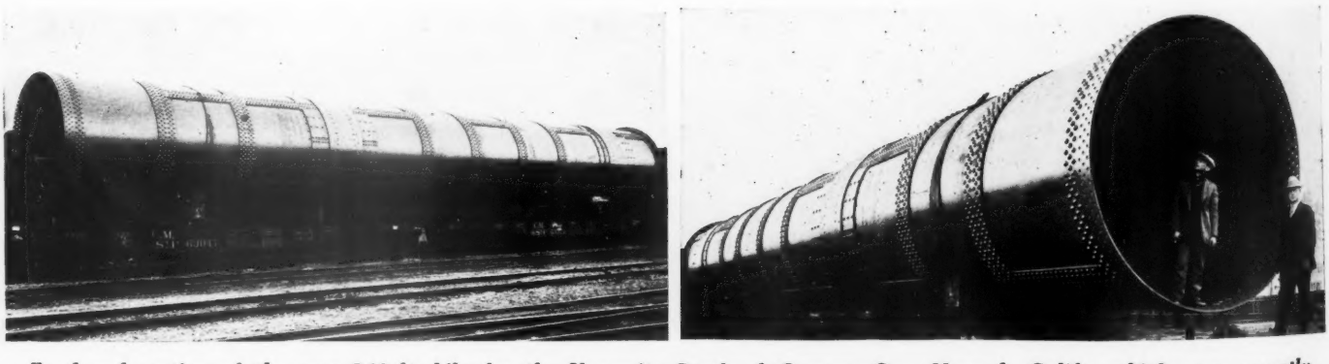
The third conclusion, that "the relation between tensile strength and compressive strength is not close," is put in somewhat stronger language in the body of the pamphlet. It says: "There is evidently some tendency for high tensile strength in a sample to be accompanied by a high compressive strength, but the relation is apparently a very weak one." And further on it says, "It can be seen (from the figures) that any prediction of compressive strength from tensile strength can be little better than a random guess."

The authors of this study are C. H. Scholer, professor of applied mechanics, and M. A. Durland, associate professor of machine design, in the Kansas State Agricultural College.



Slate in 1925

FINALLY revised statistics on the production and distribution of slate in the United States during 1925 have just been published in a recent bulletin of the Bureau of Mines. There is but little variation in this report from that of the preliminary survey published in ROCK PRODUCTS, February 20 issue. Copies may be obtained at a price of 5 cents each from the Superintendent of Documents, Washington, D. C.



Feed end section of the new 240-ft. kiln for the Yosemite Portland Cement Co., Merced, Calif., which was recently shipped from Milwaukee, Wis.

Investigation of Feldspar

IN 1922 the U. S. Bureau of Standards undertook an exhaustive investigation of the raw materials entering into the compositions of white-ware bodies and the effects of variations of the raw materials on the qualities of the finished product. The first work, on whiting, was reported in the December, 1922, issue of the *Journal of the American Ceramic Society*. The second study, on clay balls, is reported in Bureau of Standards Technologic Paper No. 227 and in the February, 1924, issue of the *Journal of the American Ceramic Society*. The third study, on flint, is reported in Bureau of Standards Technologic Paper No. 310. These studies on English china clay (Technical News Bulletin No. 113, September, 1926) and on feldspar are now in progress.

The first phase of the investigation of feldspar, namely, the study of the characteristic properties of typical commercial feldspars, is now nearing completion, and some tests have also been made on bodies in which these feldspars were used. The typical commercial feldspars, 19 in number, were obtained through the cooperation of the white wares division of the American Ceramic Society. There was one "soda spar" included in this number and the balance are so-called "potash spars." The composition of the soda spar (A) and the range in composition from the spar lowest in K_2O content (B) to that highest in K_2O content (C) are given in the following table. These values are the average of two determinations in the case of feldspars A and B and of three determinations in the case of spar C.

	Composition		
Material	Spar A Per cent	Spar B Per cent	Spar C Per cent
SiO_2	67.6	73.5	65.1
Al_2O_3	19.8	15.2	19.3
Fe_2O_3	.22	.05	.10
TiO_2	0	0	0
CaO	.5	.7	.2
MgO	.2	.1	.1
K_2O	.9	4.4	13.1
Na_2O	10.0	5.7	2.0
Ignition loss	.6	.5	.3

Grain size, or fineness determinations, were made by the bureau and also by four co-operating laboratories on specimens from the same samples, but sieves of the same number were not used by all of the laboratories, although sieves Nos. 100 and 200 were used by the five laboratories and sieve No. 325 by three of the laboratories for 16 of the feldspars. Accordingly, the results were calculated to show residues on these sieves. The average on the No. 100 sieve varied from 2.1% to 0.0% per cent, that portion passing the No. 100 sieve and retained on the No. 200 sieve varied (average values) from 7.4 to 0.3%, and that portion passing the 200 sieve and retained on the No. 325 sieve (average of three determinations) varied from 11.4 to 2.8%. Average variations in the determinations were as follows: Sieve No. 100, 0.4%; sieve No. 200, 2.4%; sieve No. 325, 7.8%; and the average variation for total residue on No. 325 sieve (calculated) was 11.2%. Separations were also made by the air-analysis method. For the finest feldspar it was found that 17.0% of the material was more than 0.04 mm. in diameter and 32.4% was more than 0.02 mm. in diameter. The greatest residue after 0.04 mm. separation was 34.1%, but this spar did not show the highest residue (48.3%) after the 0.02 mm. separation, one other feldspar having a residue of 49.1% and another of 52.1%.

The softening ranges of the feldspars varied in almost direct proportion to the K_2O content. The soda spar showed marked evidence of softening at cone 4 (approximately 1150 deg. C.), the spar lowest in K_2O content showed about the same degree of softening at cone 7 (approximately 1210 deg. C.), and the highest K_2O spar had softened to an equal amount at cone 10 (approximately 1260 deg. C.). At cone 13 (approximately 1350 deg. C.) all of the feldspars had completely fused.

The true specific gravity of the 19 feldspars varied from 2.635, for the soda feldspar, to 2.572 for the spar highest in K_2O. Check determinations were made on all of the feldspars, and the average variation between the first and the check determination was 0.002. The minimum was 0.000 and the maximum 0.005.

The results obtained to date indicate that the variations in feldspar composition and fineness of grind do not have a very marked effect on the translucency, porosity and volume shrinkage of the white-ware bodies fired to various temperatures. They do indicate that the rate of heating and cooling may have an appreciable effect on the mechanical strength. However, it is felt that these results should be checked before any detailed conclusions are given.

Nesher Portland Cement Plant in Palestine

THE picture shown here is that of the Nesher Portland Cement Co.'s plant at Haifa in Palestine. The first impressions of the inhabitants of the ancient and holy land on seeing so much illumination must have been startling, since until quite recent years, a kerosene lamp was supposed to be the "light of Asia," and to represent 100% efficiency in lighting.

The plant was described in the November 13, 1926, issue of ROCK PRODUCTS. It is of a type not built in the United States, since it employs shaft kilns and burns the material in the form of briquets. The fuel is a high grade anthracite coal brought from England and it is mixed with the raw materials before briquetting. While this method is less economical of labor than the rotary kiln, it is more economical of fuel, and in a country to which fuel must be brought from far distant points, it would seem to be the logical method to adopt.

Night view of Nesher Portland Cement, Ltd., Palestine, Jerusalem

The plant works three 8-hr. shifts, which accounts for the brilliant illumination at night. Originally designed for 35,000 metric tons of cement a year (bout 210,000 bbl.), the output is now 50,000 tons (300,000 bbl.) and is expected to increase to 70,000 tons (420,000 bbl.).

New Lime Association Bulletin

"WATERTIGHT CONCRETE," Bulletin 301, just issued by the National Lime Association, Washington, D. C., is an attractively covered and well illustrated discussion of the value of hydrated lime in concrete. The text is based upon actual experience, supplemented by laboratory data. The experience of engineers, architects and contractors, from all sections of the country, is drawn upon, and the illustrations show the character and type of construction where lime was used to make the concrete watertight. These range from structures such as the Wilson Dam at Muscle Shoals on through the whole list of concrete uses, office and public buildings, stadiums, reservoirs, tanks, basements, etc. The appendix gives the results of a series of tests carried out at the University of Wisconsin and includes data on effects of hydrated lime on the strength and impermeability of gravel concrete and limestone concrete.

Associated General Contractors See Big Construction Year in 1927

ONE of the outstanding features of the Asheville convention of the A. G. C., held January 24 to January 27, was the gathering of opinions concerning the probable trend of construction operations during 1927.

As a result of this gathering of opinion, the convention authorized a statement which declared that the volume of construction operations during the present year will probably equal, and perhaps exceed, the volume registered for the record-breaking year of 1926.

"We are convinced," the statement declares, "that a large number of economic and sociological influences are currently at work to create a steady demand for conservatively financed, well designed and soundly built structures of various types. The annual increase in population requires a large amount of construction of all kinds.

"There is an increasing tendency of population to drift from farms to cities, as well as an increased desire for speed, safety and service in transportation and communication.

"While some cities may not need immediate additional hotel, office or luxuriant apartment floor space, all types of construction activities are feeling the effect of the trend toward 'modernization.' Obsolescence of office and factory buildings, theaters and schools is constantly making a call for new structures, as is also the necessity for widening the main arteries of traffic in metropolitan areas.

"Railroads are undertaking elimination of grade-crossings, elevation of tracks and new mileage to meet newly-developing conditions. The vast volume of automobile traffic is demanding not only thousands of miles of paved highways, but that roads be widened, an operation virtually identical with the construction of new roads. A large number of garages are being required to offset no parking ordinances in cities; and toll bridges are springing up all over the country.

"Public utilities corporations are being forced to meet demands for increased service by making large additions to their plants. Subways for city transit and tunnels for lighter railway grades are now being constructed. Projects financed by federal, state, county and municipal governments will require a large volume of construction materials and labor; and river and harbor work, irrigation and hydro-electric projects are under way.

"Creation of new industries, the construction of branch houses and enlargement of old factories will help hold demand in that field of construction at a high level.

"Revision and expansion of educational methods are requiring new community, vocational and high school buildings. America is on a higher plane of demand for satisfaction of what may be termed its 'personal desires,' which are manifested in the erection of palatial movie houses, country clubs and apartment houses, libraries, water works and sewer systems, which provide the latest improvements.

"Only three years ago the report of the Regional Plan Association of New York City stated that 663,000 persons in the nation's metropolis were 'poorly housed.' It is conservative to assume that similar conditions existed at that time in other large centers of population. The record-breaking activities of the past three years have not held sufficient volume to correct these conditions for moderate housing, and at the same time meet the demands of 'modernization' in old homes.

"Banks and mortgage-bond houses, which handle the financing of construction operations, should not depend upon the volumes of building permits in the cities for their information in drawing conclusions concerning the trend of future construction. These building permits statistics do not form a true barometer of the activities of the construction industry, for they fail to include the vast volume of construction of public works, highways, railroad improvement and much public utility work. There is also a time lag between issuance of permits and the financing and completion of buildings.

"The increased volume of saving and insurance funds which seek investment, the fact that there is no reason for expecting an increase in the wages of construction labor, the tendency toward lower interest rates, the general prosperity of the country, the large volume of farm and mine production, the increasing demand for electricity, gas, water and transportation facilities all tend to confirm the general view that 1927 will be an active construction year.

"Comparison of post-war costs with pre-war prices forces the conclusion that the American construction program is on a normal basis."

Indiana May Have State-Operated Cement Plant

ESTABLISHMENT of a state-owned and operated cement mill at the Indiana state farm at Putnamville, Ind., a penal institution, and arrangement for the use of the entire output by the state highway commission in the construction of roads under its management, are the outstanding provisions of a measure to be introduced in the Indiana house of representatives.

The measure, which is said to have the support of the Indiana Farm Bureau, calls for an appropriation of $250,000 for the current fiscal year and for one of $350,000 for the succeeding fiscal period, with which to place the plant in operation. Putnamville is in a region in central Indiana where several large cement mills are situated. The stone and clay in the Putnamville district are said to be adaptable for use in cement.

The output of the proposed state cement factory would be sold to the state highway department at exact cost of production, the bill provides. The highway commission uses about a million bags of cement a year, buying the product from privately-owned plants and making it available to contractors engaged in paving state highways. Prisoners at the state farm would be compensated for their work in the proposed mill at the rate of $1.50 a day. On their release, the pay would be turned over.

New Phosphate Treating Plant for Tennessee

THE International Agricultural Corp. is planning the erection of a plant on its property near Wales, Giles county, Tenn., at a cost estimated to be about $150,000 and which will employ about 200 workers when under way.

Heretofore the company has been mining phosphate which was simply washed and dried and shipped raw for manufacturing. The new plant will grind the raw phosphate, then convert it into finished phosphoric acid.

R. S. Morris, representing Hugger Bros., Montgomery contractors, will have charge of the construction work.—*Nashville (Tenn.) Banner.*

Record Year of Construction in 1926

The 1926 construction volume was the highest on record for any year in the history of the country, according to F. W. Dodge Corp. Building and engineering contracts were let during 1926 to the amount of $6,349,914,700 in the 37 states east of the Rocky Mountains, which was an increase of 6% over the record for the year 1925. For the entire country the total 1926 construction volume must have been well over $6,800,000,000, with a probable increase of 4% over 1925.

Building and engineering contracts awarded in December in these 37 states amounted to $537,395,800. The above figure showed increases of 10% over November, 1926, and 2% over December of last year. Included in the December record were: $203,966,100, or 38% of all construction, for residential buildings; $120,290,000, or 22%, for public works and utilities; $75,196,200, or 14%, for commercial buildings; $51,180,700, or 10%, for industrial buildings; $24,927,100, or 5%, for social and recreational projects; $22,177,600, or 4%, for educational buildings; and $16,617,300, or 3%, for hospitals and institutions.

New all steel dredge operating on the Allegheny river

New Dredge of Allegheny River Sand Corporation

THE Allegheny River Sand Corp. has recently installed an all-steel dredge near Kittaning, Penn. It was built by the Midland Barge Co. The dredge is of the ladder type and contains a complete washing and screening plant. The machinery is driven by a 175-hp. steam engine which is in a separate cabin in the after part of the dredge.

The hull is 120 ft. long, 28 ft. wide and 5 ft. deep. The ladder will dig to a depth of 37 ft. and the capacity output is 200 tons per hour.

The sides and roofs of the cabins are of Armco iron galvanized sheets, selected to resist the corrosion of both coal smoke and water.

Ohio Gravel Ballast Company Reorganized

THE Ohio Gravel Ballast Co., Cincinnati, Ohio, has been reorganized by the election of the following officers: Earl Zimmerman, president; Fred W. Cornuelle, vice president and general manager, and George W. Doran, treasurer. The entire capital common stock of the company has been purchased by the men listed above.

This company is one of the oldest and best known gravel producing companies in the United States. It was founded many years ago by the father of Harry and Edward Donnelley, who carried on the business after their father retired on account of ill health, and who were nationally known in the industry not only from the size and importance of the business but from their active support of the National Sand and Gravel Association. Edward Donnelley died last year and Harry Donnelley has now retired from participation in the business.

Earl Zimmerman, the company's president, held the same office before the reorganization. He also is widely known in the industry, especially for his work in standardizing gravel railway ballast, which, as chairman of a committee of the National Sand and Gravel Association, he brought about by working with the ballast committee of the American Railway Engineering Association. This was an important advance in the industry, as it placed gravel ballast production on a sound basis for the first time. The new vice-president and the new treasurer are men who have been producers of sand and gravel for years and are also nationally known in the industry.

The Ohio Gravel Ballast Co. operates a number of plants, the largest being at Cleves, a suburb of Cincinnati. This plant is considered one of the best in the Middle West.

Imported Mica for Radios Dutiable

IMPORTED MICA, cut into squares or rectangular shapes of varying sizes, and largely used in the manufacture of condensers for radios, is properly dutiable, the United States Customs Court holds, at the rate of 30% ad valorem, under paragraph 208, act of 1922. The collector's assessment at 40%, under another provision in said paragraph 208, is reversed.—*New York Journal of Commerce.*

Huntington Company to Erect Sand and Gravel Plant

THE recently incorporated Huntington Sand and Gravel Co., Huntington, N. Y., is reported to have completed plans for the erection of a modern sand and gravel plant at that city. A 7½-acre plot containing the deposit to be worked has been purchased.

Orders for the equipment, which includes screening machinery to make four sizes of gravel, a power hoist and other machinery, have been placed. Several large storage bins will be erected on the site. Operations are expected to start early in the year. —*Huntington (N. Y.) Long Islander.*

Develop Alabama Tripoli Deposits

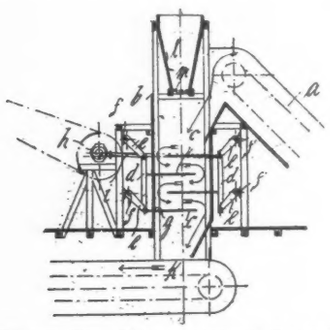
THE Alabama Tripoli Corp. has been chartered recently to develop deposits of tripoli (amorphous silica) near Jacksonville, Ala. A reducing plant and manufacturing plant for the production of "Tripolex" building brick, one of the by-products of the company's operations, will be erected.

The supervision of construction and plant operation will be under U. S. James, metallurgical engineer of the James Ore Concentrator Co., Newark, N. J. C. L. Constant Company, mining engineers, 220 Broadway, New York, will supervise chemical and technical control of the manufactured products of the company.

Charles S. McCullan of F. W. LaFrentz & Co., 100 Broadway, New York, is president of the company.

Foreign Abstracts and Patent Review

Mixing Long Fibered Materials With Cement. The fibrous materials such as wood meal, jute and straw are steeped in water or lye. These materials are transported to the mixing apparatus by means of the conveyor *a* and are fed into a four-



Mixer for fibrous materials and cement

sided shaft *b*. A number of rakes, *c*, are arranged in this shaft at equal distances from each other. These rakes make it possible to secure thorough mixing of the cement with the fibrous materials. *German Patent Application No.* 45,518.

Testing Raw Materials for Cement Making Properties. A number of tests were made in a new cement works to determine the best conditions of cement making. The limestone was very uniform in character and white throughout and easily ground. The analysis of the ground material showed loss on ignition 41.74%, silica 4.01%, alumina 1.70%, iron oxide 0.50%, lime 51.78%, magnesia 0.09% and sulphur trioxide 0.06% and indicated a good grade of limestone for cement making.

The cement rock was of yellow color, sandy and mixed with some limestone. The analysis of the rock was as follows: Loss on ignition 28.86%, soluble silica 6.40%, insoluble silica 28.84%, alumina 4.05%, iron oxide 3.21%, lime 3.61%, magnesia 0.96%, sulphur trioxide 0.11%. Cement rock of this analysis cannot be used alone for cement making, for it will yield a bicalcium silicate on burning in the place of a tricalcium silicate, with the consequence that resulting cement clinker will immediately fall into dust. Addition of 3% of gypsum produces a cement with a greatly retarded setting time, the cement not setting within 18 hr. The constancy of the volume of the set cement was also unsatisfactory. The resulting cement decomposed in steam, hot water and in the kiln at a temperature of 120 deg. C. Test pieces were firm but had but little strength.

A new raw cement mixture was made by adding to one part of the above three parts of a cement rock which had the following composition: Loss on ignition 9.38%, soluble silica 61.22%, insoluble silica, trace, alumina 22.56%, iron oxide 5.58%, magnesia 0.32%, lime 2.02% and sulphur trioxide, trace.

Calcination of this mixture produced a satisfactory cement despite a high silica content. Set began at 2 hr. 10 min. and was completed at 6 hr. 40 min. Both initial hardening and post-hardening properties were good. Test pieces were found to be resistant to the action of boiling water for a six-hour period.

Another and similar test was made in a cement mill which was having difficulties with a cement rock too plastic and hard to grind. Round lumps formed in the mills and the steel grinding balls choked with material cutting down the efficiency of the apparatus. Excess water was necessary to force the ground material out of the mill and the product could not be well mixed with the limestone. The limestone was soft and of regular composition and had the following analysis: Loss on ignition 42.12%, silica 3.10%, alumina 1.46%, iron oxide 0.38%, lime 52.48%, magnesia 0.15%, sulphur trioxide 0.15%. The composition of the cement rock was as follows: Loss on ignition 7.84%, silica 51.32%, alumina 26.91%, iron oxide 7.88%, lime 6.14% and traces of magnesia and sulphur trioxide.

The cement made from this rock and limestone was of good quality but required the addition of a large amount of gypsum (about 6%) in order to get the proper set. The difficulties were remedied by admixing a sandy cement rock with the first rock in the proportion of 2 to 1. The results were then found to be entirely satisfactory. The setting of the cement started after 2 hr. 13 min. and was completed after 7 hr. 40 min. *Zement* (1926), 917-8.

The CaO-Fe_2O_3 and MgO-Fe_2O_3 Systems. The chief purpose of the investigations was to determine whether compounds other than MgO-Fe_2O_3 were existent in the magnesium ferrite (MgO-Fe_2O_3) system. The fusion temperatures for various lime and iron oxide mixtures containing from 40% CaO to a maximum of 65% CaO were checked against previous investigators' results. Direct action of the components upon one another in the presence of $CaCl_2$ resulted in formation of the compounds CaO-Fe_2O_3 (rhombic needles) and $2CaO$-Fe_2O_3 (flat plates). Prolonged heating (2 to 4 days at 1200 deg. C.) of molecular amounts of CaO and Fe_2O_3 and $CaCl_2$ (one-half the weight of the CaO and Fe_2O_3) produced besides intermediate chlorides, the calcium ferrite $5CaO$-$3Fe_2O_3$. Under the above conditions, but changing the mixture to 3 molecules of CaO and one of Fe_2O_3, the calcination yielded, in addition to intermediate chlorides, the compound $2CaO$-Fe_2O_3 besides lime crystals. Only one compound, MgO-Fe_2O_3 is possible through interaction of MgO and Fe_2O_3. At 900 to 950 deg. C., the formation of magnesium ferrite is accelerated by dry hydrochloric acid gas as well as platinum.—*Ueber die Systeme CaO-Fe_2O_3, MgO-Fe_2O_3, by Max Eugen Grunewald, Mainz, Germany.*

Preheating of Cement Slurry. Preheating of raw cement slurry is accomplished by placing the feed pipe so that the heat from waste kiln gases is transmitted directly to the materials. *German Patent No.* 435,792.

Zoned Rotary Cement Kiln. Calcination of raw cement materials is carried on in a rotary kiln so made that a series of narrowed sections act as dehydrating, calcining, sintering and cooling zones. The kiln is rotated at such a speed that the square of the number of revolutions times the largest internal diameter of the calcining zone casing is never more than 500 meters. The diameter of the calcining zone may be decreased by building in a special condensing chamber. Advantages claimed for this type are lower fuel consumption and lower temperature of waste kiln gases. *German Patent No.* 435,077.

Effect of Low Temperatures on Setting Properties and Strength of Cement. Both the set and strength of cements are impaired by low temperatures. Addition of calcium chloride solution accelerates the setting but lowers the strength at a temperature of 15 deg. C. At temperatures of —20 deg. C., or so, the results with $CaCl_2$ are better. Cement fondu mortars to which $CaCl_2$ has been added show decreased strengths, while slag cements under the same conditions are unaffected. *Revue des Batiment,* November, 1926.

Storing Magnesia Cements. Addition of barium chloride to the magnesium chloride and magnesium sulphate of magnesia cements has been found to check the premature setting of the cement during storage in damp places.—*Mines, Carrieres et Grande Entreprises,* July, 1926.

Analysis of Lime. A small amount, 0.4 to 0.5 g. of the commercial lime is ground with successive portions of distilled water, using up to 400 c.c. of water, and the mass put into a flask. The closed flask is shaken for about 30 min. and the contents filtered into a predetermined quantity of sulphuric acid, the filter washed, and the filtrate titrated with an alkali solution.—*Analyst,* (1926) **51**, 625.

Shaft Kiln for Burning Cement. Dry raw cement material mixes are burned in a shaft kiln provided with a cooling shaft

for preheating combustion air by the hot clinker. The waste gases from kilns are utilized for low temperature carbonization of powdered fuel, a retort for this purpose being placed above the kiln. The entire kiln is placed in a shaft sunk into the cement rock or limestone deposit so as to minimize radiation losses. *E. P. C. Girouard, British Patent No.* 260,684.

Feeding Rotary Cement Kilns with Briquets. Cement is largely made in Europe by briqueting the raw material with coke or anthracite and burning in vertical kilns. N. C. Kyriacou suggests the feeding of similar briquets to rotary kilns, claiming that the method would increase the kiln output from 50% to 100%; that it would be easier on the lining of the kiln; that the heat efficiency would be considerably increased, and that the product would be more uniform. He suggests a cylindrical briquet, which would roll in the kiln, and which could be made by a commercial machine. The fuel in the briquet should contain 30% to 50% of the calories necessary to decarbonize the limestone.—*Revue des Materiaux de Construction,* December, 1926.

Hydration of Anhydrite. Investigations have shown that various substances may be used for the purpose of accelerating the hydration of anhydrite. All of these substances act as catalysts. Those that have the greatest accelerating effect are of an acid character, then come the basic salts, and lastly the neutral salts. The size of the particles of these substances has a very important effect on their accelerating power. The various acids and acid salts which are employed for this purpose do not have the same degree of fineness as possessed by the basic and neutral salts.

The action of these substances is best explained by the properties of calcium sulphate which allow the formation of complex combinations. It is accordingly possible that anhydrite forms an unstable hydrate on its surface in the presence of water and these salts. The hydrate may have the following formula: $(salt)mCaSO_4nH_2O$. This unstable hydrate then decomposes in accordance with the following equation:

$$(salt)mCaSO_4nH_2O = (salt)H_2O + CaSO_42H_2O$$

Experience has shown that the catalyzer will in time separate out on the surface of the hardened gypsum. *Tonindustrie Zeitung* (1926), 99-100, 123-125.

Natural Silicates for Making Ciment Fondu. Natural silicates of alumina and of alkalies, either alone or in admixture with each other, or in admixture with rocks and sands that contain the same silicates, are used in the manufacture of ciment fondu. Calcareous and aluminous substances are added so as to give a product of the required composition. On fusing the mixture the alkalies that are contained in these silicates are volatized and recovered. The process has the result of increasing materially the yield of potash generally obtained in the use of natural silicates. *French Patent No.* 587,175.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Building Materials from Hydrated Lime and Fibrous Material. Building blocks, slabs, tile, floors, etc., are made by mixing a fibrous material with hydrated lime, incorporating the fibre-lime mixture with a cementitious material, bringing the mass to a plastic state by adding water containing a small proportion of sulphuric acid and molding the plastic mass into the required form. *Joseph Melandri, U. S. Patent No.* 1,608,562.

Wall Plaster. Coarse ground plaster of paris is mixed with a desirable percentage of fine ground plaster of paris and water added to form wall plaster. *Curry O. Walper, U. S. Patent No.* 1,608,148.

Asbestos Excelsior Board. Asbestos fiber, excelsior and a cementitious binder are intimately mixed and shaped to desired size and thickness for use as a building material. *F. A. Bartlett, U. S. Patent No.* 1,606,051.

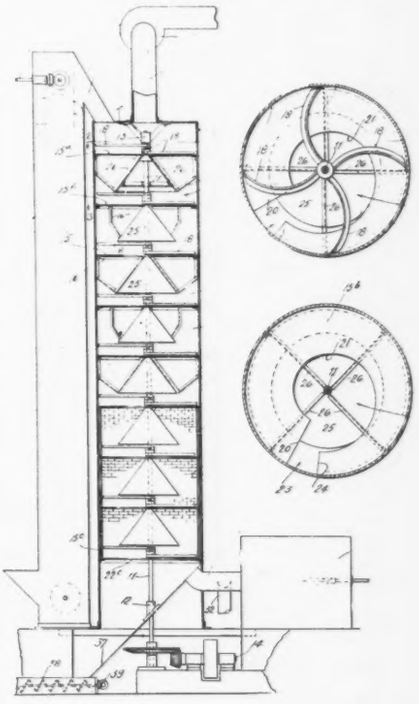
Finely Divided Siliceous Matter. Finely divided silica, metal, water and an alkaline earth oxide are heated and then calcined. The calcination product is chlorinated in the presence of water to produce the desired siliceous matter. *H. A. Andres, U. S. Patnet No.* 1,613,448.

Aluminous Cement and Potash from Alunite. The method of treating alunite and the like consisting in heating a mixture of approximately 500 parts by weight of alunite, about 200 parts by weight of limestone and about 25 to 50 parts by weight of carbon without melting the same in a rotary-kiln at a temperature of approximately 1100 deg. C. to 1600 deg. C. for a period of time sufficient to volatilize a large proportion of the potash content of the alunite and to combine the lime of the limestone with the alumina and silica of the alunite to produce a calcium aluminate cement, and recovering the potash principally in the form of potassium sulphate in a Cottrell precipitation apparatus.—*H. H. Meyers, U. S. Patent No.* 1,613,238.

Artificial Marble. Method of producing an artificial marble, which consists in mixing white cement, silver sand, marble dust, beeswax, turpentine and water, to have the consistency of a pourable mass, then subjecting the mass to agitation to thoroughly mix constituents, then adding coloring matter to the mass while under a state of agitation to provide for the coloring matter to streak the mass and finally effecting the setting of said mass. *Paul Golfinopulous, U. S. Patent No.* 1,612,808.

Silica and Asbestos Building Material. Silica and asbestos fibre are digested under heat and pressure in the presence of an alkaline hydroxide to make a building material. *W. H. Barker, U. S. Patent No.* 1,610,211.

Vertical Dryer for Solid Materials. A vertical cylindrical stack provided with elevator for delivering material to the top of the stack. Within the stack are a plurality of horizontally arranged and vertically spaced shelves or barriers, each barrier having a central opening whereby pusher arms on a centrally arranged and rotatable shaft may move the material in a thin stream from one shelf in a manner to gravitate through its opening to the shelf next below. The shelves have a peculiar conformation whereby the material may be effectually scraped therefrom. There are upwardly



Vertical dryer for solid materials

pointing cones on the shaft which are adapted to receive the material from one shelf opening and to distribute it over the shelf next below.

As the material passes downwardly through the stack it is met by an upwardly directed flow of heated air, which serves to heat and dry the material, both as it passes through the air from shelf to shelf and by heating the shelves and cones in a manner to dry the material as it rests on or moves over them.

At the base of the stack is arranged a conveyor to carry off the dry material, while an induction fan and dust collector may be connected with the top of the stack to carry off the hot, dust-laden air. *Alva Warren Tyler, U. S. Patent No.* 1,606,004.

Fused Cement. Aluminous cements or fused cements are made by continuous feeding of raw cement materials onto the hearth of a reverberating furnace, melting them by impinging fuel thereon and allowing the fused cement to flow away. *George Dumas, U. S. Patent No.* 1,615,260.

Traffic and Transportation

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Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Jan. 15	Jan. 22	Jan. 15	Jan. 22
Eastern	2,137	1,906	1,526	1,250
Allegheny	3,027	2,936	2,033	1,734
Pocahontas	104	122	370	316
Southern	459	482	9,733	9,663
Northwestern	716	671	1,424	1,900
Central Western	410	400	4,844	4,583
Southwestern	236	273	3,783	3,576
Total	7,089	6,790	23,713	23,022

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning February 14:

CENTRAL FREIGHT ASSOCIATION DOCKET

14970. **Crushed stone,** carloads, Spore, Ohio, to Zanesville, Ohio. Present rates, 6th class; proposed, 105c per net ton.

14971. To establish on **crushed stone,** carloads, Whitehouse, Ohio, to Walbridge and Lemoyne, 70c per net ton; Pemberville and Bradner, 80c per net ton, and to Rising Sun and Fostoria, Ohio, 85c per net ton. Present, 6th class. Route, via Wabash Ry., Toledo and the Hocking Valley Ry.

14981. **Sand and gravel,** carloads, Phalanx, Ohio, to Northfield, Ohio. Present rate, no through rates in effect; proposed, 90c per net ton.

14986. **Crushed stone,** from Delphos, Ohio, to Convoy, Ohio. Present rate, 80c per net ton; proposed, 65c per net ton.

14997. **Crushed stone,** in bulk in open cars, from Kenneth, Ind., to Crawfordsville, Ind. Present rate, 104c per net ton; proposed, 85c per net ton.

45008. **Lime,** carloads, Marblehead and Martin, O., to Brockway, Penn. Present rate, 21½c; proposed, 17c.

15015. **Limestone, crushed,** carloads, Detroit, Mich., to Imlay City, Mich., via Grand Trunk Ry., Pontiac, Mich., and P. O. & N. R. R. Present rate, 7c net to Grand Trunk Ry. applicable via Grand Trunk Ry. direct; proposed, 102c per net ton.

15017. **Sand,** lake and beach, carloads, Michigan City, Ind., to Almont, Mich.; Grand Haven, Ludington, Manistee and Muskegon, Mich., to Almont, Mich. Present rate, 202c from Michigan City, Ind., and 164c per net ton from the other origin points; proposed, 176c per net ton from Michigan City, Ind., to Almont, Mich.; 151c per net ton from Grand Haven, Ludington, Manistee and Muskegon, Mich., to Almont, Mich.

15021. **Sand,** carloads, Grand Haven and Muskegon, Mich., to Milan, Monroe, Sibley, Trenton and Wyandotte, Mich., also Rossford and Toledo, O. Present rate, 139c per net ton; proposed, 126c per net ton.

15028. **Sand,** except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, Kern, Ind., to Advance, Max and Lebanon, Ind. Present rate, 101c per net ton; proposed, 85c per net ton from Kern, Ind., to Advance, Ind.; 90c per net ton from Kern, Ind., to Max and Lebanon, Ind.

15032. **Sand and gravel,** carloads, Emison Gravel Pit, Ind., to Erskine, Ind. Present rate, 85c per net ton; proposed, 80c per net ton.

15033. **Sand and gravel,** carloads, Evansville, Ind., to Erskine, Ind. Present rate, 60c per net ton of 2000 lb.; proposed, 50c per net ton of 2000 lb.

SOUTHERN FREIGHT ASSOCIATION DOCKET

31800. **Crushed stone,** from Frankfort to Louisville, Ky. In lieu of lowest combination rate of 200c per net ton, it is proposed to establish intrastate rate of 90c per net ton on stone, crushed, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Frankfort to Louisville, Ky.

31829. **Sand and gravel,** from Memphis, Tenn., to B. & N. W. Ry. stations. Present rate 160c per net ton. Proposed rate on sand and gravel, carloads, minimum weight 90% of capacity of car, from Memphis, Tenn., to all B. & N. W. R. R. local stations, 135c per net ton.

31830. **Silica,** from Black Fox, Tenn., to Richmond, Ind. Combination now applies. Proposed rate on silica (silex), in packages, or in bulk, carloads, minimum weight 27 gross tons, from Black Fox, Tenn., to Richmond, Ind., 522c per gross ton, based by use of 360c per gross ton up to Cincinnati, plus 162c per gross ton beyond, as per Agent Glenn's Clay Tariff, I. C. C. A-588, beyond.

31844. **Lime,** from Wilmington, N. C., to Wadesboro, Gibson and Rockingham, N. C. In lieu of the present class "K" rates, applicable via the A. C. L. R. R., it is proposed to establish the following commodity rates on lime, other than spent, in barrels or in bulk, carloads, minimum weight 40,000 lb., from Wilmington, N. C., applicable via route of A. C. L. R. R. to Wadesboro and Gibson, 11c; to Rockingham, N. C., 10½c per 100 lb., same as rate in effect via S. A. L. Ry., the direct route.

31950. **Sand, gravel and crushed stone,** carloads, between points on the A. C. L. and S. A. L. railways in South Carolina. It is proposed to revise interstate rates of the A. C. L. R. R. and S. A. L. Ry. on sand, gravel and crushed stone, carloads, between points in South Carolina, to be on basis of Georgia-Alabama submitted scale. Statement of present and proposed rates will be furnished upon request.

31988. **Crushed stone** from Clermont, Ga., to destinations in Alabama and Florida. In lieu of lowest combination basis, it is proposed to establish through commodity rates on stone, crushed, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Clermont, Ga., to Western Ry. of Alabama stations; Central of Georgia Ry. stations in Alabama; S. A. L. Ry. stations in Florida, on and north of the line Jacksonville, Fla., and River Junction, Fla., inclusive, also Cottonton, Ala., to Montgomery, Ala., inclusive, on basis of the carriers' proposed joint trunk and short line scale. The proposed scale ranges from 87c for 10 miles and under 5, up to 152c for 100 miles, 191c for 200 miles, 214c for 300 miles and 252c per ton for 460 miles.

32011. **Lime** from Jacksonville, Fla. (applicable on traffic originating at points in Ohio), to Tallahassee, Fla. Present rate, 13½c per 100 lb.; proposed rate on lime, in casks, barrels, sacks or in bulk, carloads, from Jacksonville, Fla. (applicable only on traffic originating at Ohio points from which through rates to Jacksonville are published in Agent Jones' I. C. C. 1704) to Tallahassee, Fla., 10c per 100 lb. This will have the effect of re-establishing rate of 45½c per 100 lb. in effect from Ohio points to Tallahassee, Fla., prior to June 1, 1926.

32021. **Sand and gravel,** from Jackson's Lake, Prattville Jct., Oktamulke and Coosada, Ala., to Greenville, Ala. It is proposed to establish the following reduced intrastate rates on sand and gravel, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, to Greenville, Ala.: From Jackson's Lake, 86c per net ton; from the other origins named, 90c per net ton; made with relation to rates in effect from Montgomery, Ala.

SOUTHWESTERN FREIGHT BUREAU DOCKET

11139. **Crushed stone,** from St. Louis and Cape Girardeau, Mo., to points in Missouri. To amend Item 926A of W. T. L. Tariff 91E, naming distance scale of rates on asphalt coated crushed stone, carloads, from Dodson and Webb City, Mo., to points in Missouri for joint line application by adding Cape Girardeau and St. Louis, Mo., as points of origin. The proposed basis is 10c per ton over the crushed stone rates and was prescribed by the Missouri Commission in Case 4233. Single line rates from St. Louis on the above basis were recently established and shippers have asked that joint line rates be established on basis of 20c per ton over single line rates.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

11750. **Lime,** agricultural, minimum weight 40,000 lb. per car, from Lee, Mass., and other lime producing points listed as "Points of Origin" in N. Y. N. H. & H. R. R. I. C. C. F2731, to stations on the New Haven Division of the N. Y. N. H. & H. R. R., Congamond, Mass., to and including Turners Falls, Mass. Using Lee, Mass., as a representative origin point, to—Congamond and Southwick, Mass., 10½c; to Westfield, Southampton, Easthampton and Northampton, Mass., 11½c; Holyoke, Florence, Leeds, Haydenville, Williamsburg, Hatfield, Whately, South Deerfield and Turners Falls, Mass., 12½c per 100 lb. It is further proposed to make these rates the maximum rates on agricultural lime in carloads from all lime producing points on the N. Y. N. H. & H. R. R. (listed as points of origin in N. Y. N. H. & H. R. R. I. C. C. F2731) to the destinations above referred to. Reason—To enable shippers on the N. Y. N. H. & H. R. R. to compete in the territory here involved.

11718 (2-R). **Lime,** minimum weight 50,000 lb., from N. Y. N. H. & H. R. R. Lime shipping stations to Cranford, Townley, Netcong, Branchville, Newton, South Orange and Elizabethport, N. J., and to Neshanic and Royce Valley, N. J., 19½c. Reason—To provide rates that will permit movement.

11719 (2-R). **Lime,** minimum weight except in bulk, 40,000 lb., from points on the N. Y. N. H. & H. R. R. and C. N. E. Ry. taking "Boston" Rate Basis in N. Y. N. H. & H. R. R. Co. I. C. C. F-2426 to Buffalo, N. Y., and "Niagara Frontier" points, 20½c, in barrels or bags. Reason—To permit of shippers using other packages than barrels and enjoying the commodity rate now applicable only to the consignments when in barrels.

11720 (1-R). **Lime,** minimum weight 60,000 lb., New Milford, Conn., to South Brooklyn Ry. stations, viz.: Kensington, Greenwood, Gravesend, Bath Beach and 39th St. and Third Ave., 16½c; Coney Island, N. Y., 19c; Bedford, Bushwick, East New York and 40th St. Station, New York, 20½c. Reason—To develop movement of this traffic.

Proposed I. C. C. Reports

18630. Rates on sand and gravel from Cleves, Ohio, to Sixdam, Ky., from October, 1923, to September, 1925, found to be not unreasonable and case recommended dismissed.

16197. Rate of 26 cents on cement from Navarro, Penn., to Dunraven, N. Y., unreasonable to the extent it exceeded 22.25 cents and reparation awarded.

Texas Concrete Pipe Company Enlarges

AT a meeting of the stockholders of the Mercedes Concrete Pipe Co., Mercedes, Texas, held in that city recently, it was voted to increase the capital stock from $15,000 to $50,000. This was done, it is said, to permit an expansion program which the firm has mapped out for the current year. New machinery and equipment costing $10,000 has been added and additional property purchased. Machinery for manufacturing the bell and spigot type of concrete, as well as the tongue and groove, has been installed.

During the past year the business of this plant has shown a material increase. At the present time it is operating day and night, and in addition to supplying concrete pipe and other products to the immediate vicinity.

At the meeting, the following officers were elected: H. B. Sheay, president; W. F. Shaw, vice-president; and H. M. Rouse, secretary-treasurer. J. C. Shaw of Philadelphia, who moved to Mercedes recently, has been added to the personnel of the plant as director of manufacturing.

Stringent Blasting Regulations Proposed for Montreal

A NEW set of regulations tending to exert a closer control by the city over quarries and blasting operations has been drawn up in by-law form by the administration and this will be proposed to the city council. In these it is explicitly forbidden for anyone to detonate a blasting charge within 3000 ft. of any building, and without this limit even the charge of dynamite or blasting powder is limited to 25 lb. Two-thirds of the proprietors within a radius of 3000 ft. of the proposed quarry limits may effectively oppose the granting of a permit for a quarry and may therefore prevent the operation of such.

The formalities which a quarry owner must fulfil include the filing of an application with the building superintendent, showing in plans the location of the quarry, all buildings to be erected thereon, the machinery and housing for such, and the location of all surrounding buildings within the 1000-yd. radius. No smoke or stone dust nuisance will be tolerated. The building department shall then notify the city clerk, who will advertise the application in two dailies, in each language, and copy of such application shall be conspicuously posted on the proposed site. Applicant is required to deposit $10 security with the city treasurer to cover cost of advertising, etc. Written opposition on the part of two-thirds of the neighboring proprietors, sent to the city clerk within 15 days of publication of the notice, shall prevent the granting of a permit.

When the above formalities have been complied with, and if the interested proprietors do not object, the administration may grant the permit to the quarry operator. The operation of the quarry is contingent upon observance of the by-laws concerning storage of explosives and the carrying out of the other stipulations of this by-law. A penalty of $40 fine and two months' imprisonment is added.

Relative Method of Determining Particle Sizes

A RECENT issue of *Industrial and Engineering Chemistry* carries the results of an investigation made by G. F. A. Stutz and A. H. Pfund on methods for determining the particle size of pigments. The methods and apparatus used have particular bearing on the cement industry. Several cement technicians in the United States are at the present time engaged in trying out very similar methods on portland cement. In England, G. and T. Earle, Ltd., are said to have had considerable success in establishing the grain size of fine cement particles, through the use of apparatus designed to operate on principles quite similar to that discussed in the following abstract.

The above mentioned paper describes an apparatus developed to measure accurately the relative average size of a pigment, by determining the opacity of a suspension of the pigment. Previous obscuring power methods have used the depth of suspension necessary to obscure a lamp filament as a measure of particle size. In this apparatus the amount of light transmitted by a suspension is photometered, and used as a measure of the average particle size of the suspended material.

When the particle size is greater than the wave length of light, the weakening of a beam of light passing through the suspension is due to reflection of the light by the surfaces of the particles (a very efficient process). Decreasing the particle size increases the surface available, and hence the amount of reflection, resulting in a decrease in the amount of light transmitted by the suspension. However, this condition does not hold if the particle size is small in comparison with the wave length of light. When a ray of light meets such a small particle, the particle acts as a source and scatters some of the light. The intensity of this scattered light is proportional to the sixth power of the diameter of the particle. Now, if the particle size is further reduced, while the number of particles is greatly increased, the efficiency of the scattering process becomes so low that the amount of light transmitted by the suspension is greatly increased. It is therefore evident that, starting with a particle size large in comparison with the wave length of light, and decreasing the particle size continuously down to colloidal dimensions, the intensity of the light transmitted must pass through a minimum for some definite particle size.

New South Wales Rock Products Industry Increases in 1925

THE use of portland cement has greatly South Wales, Australia, for 1925 was about 304,000 long tons (1,824,000 bbl.), valued at £1,320,000 ($6,400,000), according to Trade Commissioner E. G. Babbitt, Sydney, Australia, writing in *U. S. Commerce Reports*. This was the greatest production of the commodity ever recorded for that state. With additions to existing plants and another company added to the list of producers during 1926 a substantial increase is expected to be reported for the past year. The various quarries producing concrete aggregate, road material, etc., also increased their production to meet the general expansion of building activities.

Southern Dealers Re-elect R. D. Herbert President

R. D. HERBERT, of T. L. Herbert & Sons, Nashville, Tenn., sand and gravel producers and dealers, was re-elected president of the Southern Builders Supply Association at their eighth annual convention recently held at Miami, Fla. All the other officers were also re-elected to serve in 1927. The Southern association numbers among its members and officers many who are producers as well as dealers of rock products.

Magnesite in 1925

MINES in the United States produced 120,660 short tons of crude magnesite valued at $1,432,700 in 1925, according to final statistics issued by the Bureau of Mines, Department of Commerce. This was an increase of 560 tons and 38% in value as compared with 1924. Of the total output in 1925, 64,600 tons were produced in California and 56,060 tons in Washington. Most of the California production was sold as caustic calcined magnesite and most of that in Washington as dead-burned. There were five active producers in California operating at seven localities in four counties.

Producers reported that at the end of 1925, 3190 tons of crude magnesite as compared with 6000 tons in 1924 were in stock on the dumps. This figure is exclusive of fines at several dumps for eventual calcination.

The market in 1925 for domestic magnesite of all grades was only fair and producers still insist that east of Chicago they cannot compete with foreign magnesite. Caustic calcined magnesite from India and Greece sells at a lower price on the Atlantic coast than domestic material of equal grade.

Further information on the magnesite industry in 1925 can be found in the bulletin called "Magnesium and Its Compounds in 1925," which can be obtained for 5 cents per copy from the Superintendent of Documents, Washington, D. C.

Strange Influences on Demand for Building Materials

STRANGE influences are bringing about readjustments in building costs, according to Allen E. Beals in the current *Dow Service Daily Building Reports.*

The mere shift in volume demand of a certain make of automobile, for example, was sufficient at the week-end to cause a 10% cut in plate glass.

Even the current whim of women to prefer low shoes to high has brought about changes in the manufacturing methods in the wall plaster industry, in some cases, and the glorification of old-time methods in others.

The lumberman's dream of applying to his industry the pork packer's boast that he turns into cash every part of the pig but the squeal, has at last come true, for now even the bark of the tree has a part in making man's habitation less costly to build and far more comfortable to live in.

The fact is, cost lowering factors in the building construction industry as it finds itself constituted today are arising from sources far removed from the influences that controlled the final readjustment of building costs subsequent to the close of the Civil or the Spanish-American wars.

The best illustration of how closely knit the building construction industry is to others is found in the fact that a few weeks' slowdown in the manufacturing schedule of even one make of automobile is sufficient to throw back on the building market so much glass that the vast construction market cannot absorb it fast enough to keep prices steady.

At any rate, this is given as the main reason for a 10% cut in plate glass prices announced over the week-end by one of the largest distributors in this country, with considerable likelihood that the lead will be followed by others. Incidentally, the continued heavy importation of European-made plate glass is not helping the American manufacturer out of his domestic dilemma.

As to the influence that the current vogue in women's shoes has upon gypsum plaster, it seems that when women wore high-topped kid shoes the number of young goats killed in the United States to supply this need gave the plaster manufacturers the kind of soft, pliable, yet tenacious hair they wanted for use in making the plaster for use as lath-layer on which the subsequent coat and, finally, the finishing plaster were laid. Meanwhile the cost of kid hair went up.

By the middle of 1925 the cost of kid hair became so high that it became necessary for manufacturers to try cottonwood fiber and sisal as substitutes. Meanwhile the production of plaster went on at such a great pace that plaster prices began to fall as competition got keener and keener, until those who once wished that women would go back to wearing high-topped kid shoes no longer cared whether they ever did so again, while the plaster manufacturer who still uses goat kid hair in his product hopes they will keep right on wearing low shoes so as to keep the goat kid hair that is still available to him away from the price raising influences of increasing demand.

The rapidly rising market for insulation materials of one sort or another accounts in some measure at least for the phenomena that is becoming generally observed, namely, that whatever slackening that may take place in large city construction is being offset by what appears to be another private house building program, especially in the small suburban communities.

Thousands of prospective home builders are beginning to realize that this is the year they have been waiting for, when good builders are available for taking hold of their construction operations and when the building material manufacturers of the country have caught up with demand, have some surplus, and really compete for the business the prospective builder has to offer.

The home builder of tomorrow recognizes that invention has been playing into his hands, too. New material, new methods of building and, in brief, better building value is more likely to accrue to the builder of 1927 and 1928 than in recent years, because of readjustments that have taken place and will transpire this year and next.

George O. White New Sales Manager of National Cement

GEORGE O. WHITE has been appointed sales manager of the National Cement Co. and the Georgia Cement and Stone Co., effective January 29 last, to succeed Frank G. Conkling, resigned. At the same time Edward W. Russell was appointed assistant sales manager.

The National cement mill is at Ragland, Ala., and the Georgia company's crushing plant at Portland, Ga. Sales offices of both concerns are at Birmingham, Ala.

For the past two years Mr. White has served as assistant sales manager of the two companies.

He has been engaged in the cement industry since the war. Discharged from the army in 1919 with the rank of captain of engineers, he became connected with the Portland Cement Association and was placed in North Carolina as a field engineer. For five years he represented the association in North Carolina, during which time North Carolina's great highway system was inaugurated and built. The next year he resigned as field engineer to become North Carolina sales representative for the National Cement Co. In 1925 he was brought to Birmingham as assistant sales manager.

Mr. Russell has been with the National company for about six months. For five years previous he was with the Atlas Portland Cement Co.

Universal Gypsum and Lime Elects Four New Directors

STOCKHOLDERS of the Universal Gypsum and Lime Co. at the recent annual meeting elected Norman G. Hough, R. G. Rankin, C. F. Kaler and F. Krumholz to the board of directors to succeed W. A. Brewerton, Rodney Hitt, M. A. Johnson and Thomas Thorkildsen. At the meeting of the board two officers were added to fill newly created positions. Norman Hough was named as vice-president in charge of sales, and S. P. Cross was made assistant secretary. Stockholders will probably receive the financial statement for the year ended December 31 within a short time.

Cumberland Portland Soon to Start Operation

THE new 2000 bbl. per day cement mill which the Cumberland Portland Cement Co. is building near Cowan, Tenn., is reported to be nearing completion and operations expected to begin within a short time. The mill is located near deposits of limestone and clay owned by the company. The plant will manufacture both white and standard portland cement and will be the only plant south of the Ohio river to produce white cement. The decision to manufacture this type of cement is said to be based on an exhaustive investigation of the raw materials by the Pittsburgh Testing Laboratory.

Some months ago the company offered a limited amount of 7% cumulative preferred stock, on which interest was to begin from the date of the issue.

The stock was offered at $90 per share of $100 par value, with a bonus of one-half share common, no par, stock with each share of preferred.

The company has been chartered under the laws of Delaware and is capitalized at 20,000 shares of $100 par value preferred, 7% cumulative stock and 20,000 shares common stock, no par value.

The officers of the company are: W. V. Davidson, president; J. R. Green, vice-president; H. M. Greene, secretary and treasurer; C. V. Hicks, assistant secretary and treasurer; Ralph Miller, general manager; Frank Pearson, assistant general manager.

Making Cement at the Superior Portland Cement Co.'s Mill

A RECENT issue of the Concrete, Wash., *Times* carried a full page story with illustrations on the manufacture of portland cement at the Superior Portland Cement Co.'s mill at Concrete, Wash. This plant is one of the most modern in the United States, providing about 5000 bbl. per day using the wet process. The mill supplies a good portion of the cement consumed in the Northwest territory.

Cement Products

Annual Convention of the Wisconsin Concrete Products Association*

Many Sales and Promotional Arguments Made Available

MORE than 200 concrete products manufacturers attended the fifth annual convention of the Wisconsin Concrete Products Association, held at the Hotel Pfister, Milwaukee, February 3-4.

The outstanding feature of the sessions was that many manufacturers were shown how the future of concrete products is on the verge of great development. The numerous, well posted speakers on the program, one after another, dwelt upon the new trend in building, the using of the quality concrete block and stucco. The largest obstacle in the way of an immediate increase in the volume of business, the speakers said, was to overcome the prejudice in the public mind that concrete products do not stand weather tests, look ugly and are always damp. These things, however, are all overcome; and it remains only to convince the public by renewed effort, and then production will increase greatly at all plants.

Wisdom and Humor—Mixed

G. O. Gochnauer, president, in his annual address told of the excellent progress made by the association both in its own interests and in influencing the public to use more concrete products. His address was, in part:

"We are proud of Wisconsin and Wisconsin should be proud of us. In the four short years of our existence we have accomplished more than the concrete products association of any other state. We hold more certificates of quality among our members than of all the other states together. We have earned the co-operation of the State Industrial Commission. Our members are up and coming men who have actually changed the 'Cement Block,' into the 'Concrete Block,' during these short years, men who have raised our product from a lowly despised substitute to a first-class building unit that can stand on its merit.

"We are apt to think of this age as one of great civilization, but as yet we are very crude. We dump our sewage into the river below our towns forgetting that there are other towns above and below us. We have cut down our forests to provide homes of wood, a prey to decay and fire. The woodlands of northern Wisconsin are but a myth today. We are barely past the age where imitation stone siding of 'tin' graced the sides of stores.

"But the day of reckoning is at hand.

G. O. Gochnauer, retiring president

Anyone who travels through the brush lands of the state can realize that. Wealthy Chicagoans who, by dumping their sewage into the Illinois river have ruined the bass fishing in the wonderful stream, are now buying up our northern lakes. The rest of the land is waste and fuel for yearly fires. Where are we going to turn for building materials? We are going to turn to those vast piles of sand and gravel that the glacial age so generously deposited throughout our state. With a purely state product conscientiously manufactured by our association members, we can supply every building need.

" 'State product,' you say. 'How about cement?' We can skin on the cement. The Portland Cement Association shows us how. Take this case for example. You are making a block that meets the state requirement of 700 lb. per sq. in. You are making it either rather dry or very wet, depending on your method of manufacture. You mix one minute and place your block outdoors to dry. It is inconceivable that you could make a 700-lb. block under these conditions by using plenty of cement. Now by using just the right amount of water you can save 50% or more of that cement and still have a 700-lb. test block. Then by mixing five minutes instead of one you can save 25% of cement still maintaining your 700-lb. test. Then by proper curing methods you can save another 25%. Fifty and 25 and 25 is 100% you save, so you need no cement at all. In fact, by watching the fineness modulus and a few other items you can make the block owe you cement. We must be sure though to follow carefully the information the Portland Cement Association gives us or our business may be like the farmer's horse which, just when he had trained it so it could go without eating, it up and died on him!

"We must make a good product. We must make an economical product and we must advertise. Advertising pays.

"Governor Zimmerman, in his talk last year, said that he was in favor of the repeal of the personal property tax. This strikes home when spring rolls around, and we have a nice large stock of blocks in our yard on which we have to pay this personal property tax. These blocks in nearly every case are made with borrowed money and are

*Contributed.

really not ours at all. Governor Zimmerman cannot repeal that law. It is up to us as individuals to ask our representative to repeal it. We cannot get anything in this world without striving for it. In our own association we are too prone to let our secretary do all the work. We cannot sit under an apple tree and wait for an apple to drop. By that time it may be wormy, or decayed, or some other progressive person may have reached up and picked it.

"We are all troubled by competitors. This manufacturer is cutting the price and that one is making a poor product. WHO IS OUR COMPETITOR? The man who is in the same line of business or the the man who is in a competitive line of business? Why should we waste time and money in civil war when there is glory and spoils in foreign fields? Why should we worry when Jim is cutting off his own nose, by cutting the price of blocks for a house foundation, when we can go out and sell concrete products to replace clay brick or tile on a factory job? Very often the reported cut is only a ruse on the part of the customer to compel us to cut. Often the business of such a customer we can do very well without. Let's face the real foes with advertising as our weapons. We have a product well worth world-wide use. Let's not sit back and wait for that apple to fall, but let us reach up and place our products in the walls of homes, stores, warehouses, factories and palaces. Advertise by word of mouth, by personal letters, and through the newspapers constantly.

"The Portland Cement Association has done wonders for our association. They have done wonders for us through our association. No greater things have they done than in handing us Duff Abrams' theory of the water-cement ratio. If all the cement used in the concrete industry was mixed under the guidance of that theory then indeed would the slogan, 'Concrete for Permanence,' be realized.

"Let's not sit back waiting for that apple to fall. Let's ask the Portland Cement Association how we can apply the water-cement ratio to our own factories. Let us ask the fire insurance companies why the premiums on concrete masonry structures are high in face of the facts. Let's insist that city building codes be made fairer to our products. We want no favors but our just rights."

Mortar for Concrete Building Units

J. F. Winkler of the Portland Cement Association spoke on "Mortar." He rather startled some members of the convention by telling them that the proper way to lay a unit was by using a mortar composed of one part cement, one part lime and six parts of sand. Also that the unit should be laid dry. Most of the members raised the objection that they had always been instructed to lay units wet. Mr. Winkler, however, maintained that a wet unit is a swollen unit and when laid above grade will crack when the whole structure dries.

"The main cause of cracking in concrete products today is too rich a mortar mixture and a swollen block," said Mr. Winkler. "That is one reason why people today are unwilling to use concrete products in the building of office buildings or homes. They are afraid that after the units dry, some part of it will crack, making an ugly gap that is hard to repair."

He stated that one part cement, one part lime, six parts sand mortar mixture makes a strong bond that holds up for years and practically insures permanency. The proper mixing of materials is the thing to strive after in good concrete products manufacuring, he said. When a concrete block is manufactured it should be thoroughly cured before it is permitted to be laid or even sent to dealers. If a manufacturer sends out swollen units to dealers or jobbers the results are almost certain to be disastrous. There is no reason why the concrete products manufacturer cannot continue his operations through the winter, even in spite of adverse weather conditions. However, he should take the proper precautions, he said, which include heated water, dry, running sand and an adequate curing system. Frozen water and frozen sand will cause swollen blocks that never give satisfactory service, Mr. Winkler pointed out. If wet units must be laid they should be laid below grade, he said. The condition of the soil is damp which means that most wet blocks will always retain their moisture without cracking.

Architect on Use of Concrete Products

Russell Barr Williamson, well known Milwaukee architect, then addressed the convention on "An Architect's View of Concrete Products." Mr. Williamson has done a great deal of building in Milwaukee where he has had occasion to use concrete products, especially in ornamentation work. He stressed the fact that builders are using concrete more and more in construction work and that it can be used to good advantage in massive construction where the natural stone becomes too expensive. The main reason concrete products have not been advocated more by architects is because there was some doubt as to the quality of the stock. This, however, is gradually being overcome, said Mr. Williamson. He said that it will not be very long before concrete products will take their place as the leading building material.

He stressed particularly the wonderful ornamental effects that can be obtained by using cast products and stated that concrete products can be made to give strength, beauty and impressiveness.

Mr. Williamson told of the use of concrete which he had carried out in the new $1,000,000 clubhouse of the Milwaukee Aerie No. 137 of the Fraternal Order of Eagles, and stated that everyone was pleased with the effects of the work. "Concrete lends itself to monumental purposes," said Mr. Williamson. "It is also much cheaper than true stone and even looks nicer when finished. Concrete is rapidly taking its place in the building world; it is now only a case of getting quality before the public. It is really very easy to sell because it undersells any other material. Economy also enters into the situation. With one model you can reproduce as often as you like."

Mr. Williamson then read a paper, "The Basis of Tomorrow's Design," in which he stated that the concrete offers expression to beauty, color and impressiveness. Also that the age at present is one of concrete construction.

Merchandising

W. D. M. Allen, manager, Cement Products Bureau, Portland Cement Association, Chicago, then spoke on "Merchandising Concrete Products." He had nothing but words of praise for Wisconsin manufacturers, and stated that they had accomplished more than any other state in so far as advancement and general interest was concerned. It is now fully proved that Wisconsin men make good concrete products, he said. The problem now is to cut the cost of production down to rock bottom. The industry in general must believe that it has a quality product and must go after merchandising. The total value of concrete products has risen from $10,000,000 in 1918 to $140,000,000 in 1926. This shows the extent to which concrete products has forged ahead in the building industry of the entire country.

The big problem in the concrete products industry is to sell the production, said Mr. Allen. Every plant needs a few good salesmen who can go out and get orders to keep the plant busy all the time. Salesmanship and merchandising will do much to raise the volume. He stressed the fact that the concrete products industry must get much of the business now taken by the brick and clay tile industry. Concrete products are a cheaper and more durable material, he said, and with the wonderful effects that can be worked out with stucco can complete when it comes to artistic effects.

In order to carry out a successful sales campaign and merchandising campaign two factors enter, he said: (1) a favorable price differential and (2) better sales methods. It was his opinion that consolidation of management of concrete products plants will come in the very near future. Consolidation will mean lower overhead with a greater volume and a better sales organization.

Tested Quality

Chris Weipking, of the testing laboratory of the University of Wisconsin was then introduced by the president as the "Guardian Angel" of the industry. Mr. Weipking told of his experiences testing the various building materials, particularly concrete. He stressed the fact that he found products of Wisconsin manufacturers very good and said

that they were paying more attention to curing units than they used to.

Stucco Demonstration

The banquet Thursday evening in the Fern Room of the Hotel Pfister was very well attended. L. S. Brodd, district engineer of the Portland Cement Association was the toastmaster. The feature of the banquet was the demonstrating of the use of stucco on concrete products by Fred Prendergast of the California Stucco Products Co. Mr. Prendergast showed how wonderful color effects can be attained with stucco and how well it works with concrete as a base.

There were many painters and plasterers at the banquet and they were also very much impressed by the demonstration. Many of the plasterers learned the way of applying stucco on concrete. This was stressed by C. Gochnauer as being very important, because concrete products manufacturers after selling a stucco concrete products job must have a plasterer who can apply the stucco correctly.

Illustrating Sales Approach

The Friday morning meeting opened with four skits which were an innovation in program making. Skit No. 1 showed a scene in a modern concrete products manufacturer's office, where the president and his foreman discuss problems of the factory. The salesman for the company enters and tells of his experience in selling to the trade. He told a prospective customer that concrete block and stucco made a much better material than brick.

The whole idea of Skit No. 1 was to show that the public does not realize the value of stucco over concrete block. Also that the manufacturer has much to do by going out and telling people that they should use his products.

Skit No. 2 depicted a scene in an architect's office. The salesman for the manufacturer entered and asked the architect if he had planned on using concrete block in his proposed buildings. The architect said, "No" that he "had not given it much thought." The salesman than explained the favorable characteristics of concrete units, its advantages, facilities for stucco application and fireproofness, etc. When the salesman left the architect promised that he would investigate and probably use some of the concrete in his buildings.

Skit No. 3 showed a scene in the city building inspector's office between the concrete products manufacturer and the building inspector. The manufacturer talks to the inspector and tells him of the advantage of using concrete block, particularly for fire protection. When he leaves the office he has convinced the building inspector that concrete products are good products to use and a very amiable friendship is begum. The moral was that manufacturers should make the acquaintance of the building inspector and thus gain admittance to some valuable information and influence.

Skit No. 4 showed the final result of the propaganda of the previous skits. Mr. Monroe, a builder, is convinced that he should use concrete block and stucco for beautiful homes, and he promises to spread the good word to other builders.

The whole assemblage liked the skits very much. They were participated in by members of the association. It was then resolved that the men who put on the skits should be sent to Chicago as the association delegates to the next national convention. They will put on the same four skits there.

Question Box

A "Question Box" discussion followed, during which several members raised many questions, chief of which were: Cost of laying blocks, should wet or dry blocks be laid in a job, what is the best way to cure concrete products, how should they be stored during the winter?

It developed that the cost of laying a block on the basis of 1000 to the job, ran between 10 and 15 cents per block, depending on the cost of labor in various sections. A discussion on the repair of cracks arose. It was suggested that the best way was to chisel it off and fill it with new material, also to put in new mortar, if it was a mortar crack. Cracks very seldom develop below grade they said. If cracks below grade occurred they were due to faulty construction, or a bad footing.

Officers Elected

The new officers for the following year are: Les Gruehe, Sheboygan, president; A. W. Scheer, Milwaukee, vice president; L. Schwalbe, secretary and treasurer. D. R. Collins was elected the representative to the national convention.

Directors elected were: George Leuty, Beloit; Chris Olson, Oshkosh; C. Gochnauer, Appleton; John Sorenson, Racine; Art Devos, Milwaukee; Frank Johnson, Ellworth, and William Radthe, Eau Claire.

W. H. Sharp to Head Northwest Concrete Products Association

W. H. Sharp, manager of the Longview Concrete Products Co., Longview, Wash., was chosen as the 1927 president of the Northwest Concrete Products Association at the annual convention recently held at Seattle. Mr. Sharp, who was secretary of the association during 1926, succeeds W. F. Paddock of Seattle. The next year's convention city will be chosen at a future time by a special committee.

E. V. Bull of Ontario, Ore., was elected first vice president; Hans Mumm, Jr., of Everett, second vice president; J. R. Newell of Spokane, third vice president; J. J. Collins, Portland, secretary-treasurer; and F. R. Zaugg of Seattle to succeed himself, as executive secretary.

Approximately 100 delegates from all over the Northwest attended the convention. —*Longview, Wash., News.*

Concrete Brick Manufacturer Liable

QUITE often manufacturers or sellers are involved in litigation where the product fails to render the degree of service and satisfaction guaranteed by the sales representatives.

An example of this situation is supplied by the case of Independent Shope Brick Co. V. Dugger, 285 S. W. 599, which has just been decided. The higher court sustained the verdict of the lower court which held the seller of brick liable in an action for damages where it was shown, that the seller's agent guaranteed the brick to be waterproof.

Evidence was introduced to prove that the sales representative solicited business from the owner and was informed of the conditions under which the building was to be constructed. After the building was completed the owner observed that the walls were not waterproof. He instituted legal proceedings against the seller for $8,000 which was allowed.

The seller of the brick contended that the building could be repaired at the cost of from $500 to $1,500 by stuccoing the house on the outside, and that the only damage to the residence in such case would be a matter of taste.

However, in upholding the verdict of $8,000 damages, the higher court said:

"Of course, if this building could have been repaired at a cost not exceeding $1,500, then it would apparently be unjust for Dugger (owner) to recover $8,000 even though the new stucco building, not desired by him, did not suit his taste. At least, that seems to be a more reasonable and just rule. But since the jury found . . . we are not required to decide this contention, and do not do so."

However, in another very recent case (133 S. E. 279), the litigation involved a guarantee given by a manufacturer to a dealer, who in turn sold the product to a user. At the time of the sale the dealer called the builder's attention to the manufacturer's guarantee. Later the user contended that the product was not as represented by the guarantee, and sued the manufacturer.

In holding the maker not liable, the court said:

"Where personal property is sold, and, there are defects latent and concealed, and unknown to the vendee (user), and a subsequent purchaser is injured by reason thereof, an action for damages . . . sometimes arises against the one negligently putting the thing into circulation. But a warranty of soundness is not negotiable, . . . A warranty does not run with the article sold . . . The remedy of the subsequent purchaser is against his immediate seller, and not against the original owner."

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	.....	1.60	1.30	1.30	1.30
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	.....
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@ .75	1.20@1.30	1.15@1.25	1.10@1.15	1.10@1.15	1.05@1.10
Munns, N. Y.	1.00	1.50	1.50	1.25	.....	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	.....
Walford, Penn.	.70	.....	1.35h	.....	.....	.....
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Bloomville. Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo, Iowa	1.10	.....	1.40	1.20	1.25	1.25
Chasco, Ill.	1.00@1.30	.....	1.00@1.15	.....	1.00@1.15	.....
Columbia, Krause, Valmeyer, Ill.	1.10@1.50	1.10@1.25	1.20@1.35	1.10@1.35	1.10@1.35	‖1.25
Flux (Valmeyer)	1.10@1.50	.....	.....	1.75	.....	1.75
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood and Buffalo, Ia.	1.10	.....	1.30	1.20	1.25	1.25
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Montreal, Que.	.75	1.30@1.45	1.15	.90	.85	1.00
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Stone City, Iowa	.75	.....	†1.10	1.05	1.00	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	.....	1.00	.90	.90	.....
SOUTHERN:						
Alderson, W. Va.	.50	1.45	1.35	1.25	1.15	1.10
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75	.....	2.65	2.65	2.40	2.00
Chico, Tex.	1.00	1.35	1.25	1.20	1.10	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.50	1.35	1.35	1.20	1.20	.....
Graystone, Ala.			Crusher run, 1.00 per ton			
Kendrick and Santos, Fla.			3½ in. and less, 1.00 per ton			
Ladds, Ga.	.....	.....	1.50	1.35	1.15	.....
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Kansas City, Mo.	.75	1.50	1.50	1.50	1.50	1.50
Rock Hill, St. Louis Co., Mo.	1.35	1.35	1.35	1.25	1.25	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.55	1.35	1.25	1.25
New Haven, New Britain, Meriden and Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.70	2.20	2.00	1.60	1.60	.....
Oakland and El Cerito, Cal.	1.00	1.00	1.00	.90	.90	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
San Diego, Calif.	.....	2.75	2.55	2.35	2.35	.....
Springfield, N. J.	2.00	2.10	2.10	1.70	1.60	1.60
Toronto, Ont.	.....	3.58@4.05	3.05@3.80	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.	.....	2.00	1.75	1.75	1.60	.....
Eastern, Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.60b	1.60f	1.40	1.30	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	.....	.....	1.40	1.25	1.25	1.25

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.1[illegible] (e) Dust. (f) ¾ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	4.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—50% thru 50 mesh, 2.50; 90% thru 4 mesh	1.75
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Ft. Springs, W. Va.—50% thru 4 mesh	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh, bags	3.95
Bulk	2.70
(Paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.25; bulk	2.75
Joliet, Ill.—90% thru 100-mesh	4.25
Knoxville, Tenn.—80% thru 200 mesh, 3.00; 80% thru 100 mesh, bulk	2.70
Ladds, Ga.—Analysis, $CaCO_3$, 58%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh	1.50@ 2.50
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Middlebury, Vt.—$CaCO_3$, 99.05%; 50% thru 200 mesh; sacked	5.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%: 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 95%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Syracuse, N. Y.—Analysis, 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk	2.75
Toledo, Ohio, 30% through 50 mesh	2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.30
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Analysis 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk	3.25

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Brandon and Middlebury, Vt.—Pulverized, bags, 5.50; bulk	3.50

(Continued on next page)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.75
50% thru 4 mesh 1.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 100% thru 4 mesh ..... 1.10@ 1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk 3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh 1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50
Kansas City, Mo.—50% thru 100 mesh ..... .75
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh ..... 1.85@ 2.35
McCook, Ill.—90% thru 4 mesh ..... .90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh 1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50
Mountville, Va.—Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh bags 5.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh 1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh 1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes 1.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh; (for mine dusting and asphalt filler) 3.50
Piqua, Ohio, sacks, 4.50@5.00 bulk ..... 3.00@ 3.50
Rocky Point, Va.—82% thru 200 mesh, 2.50@3.50 bulk, paper bags ..... 3.75@ 4.75
Waukesha, Wis.—90% thru 100 mesh, bulk 4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va. ..... 2.00@ 2.25
Buffalo, N. Y. ..... 2.00@ 2.50
Cedarville and S. Vineland, N. J.—
Damp 1.75
Dry 2.25
Columbus, Ohio ..... 1.00@ 1.50
Estill Springs and Sewanee, Tenn. 1.50
Gray Summit and Klondike, Mo. ..... 1.75@ 2.00
Los Angeles, Calif.—Washed 5.00
Mapleton Depot, Penn. ..... 2.00@ 2.25
Massillon, Ohio 3.00
Mendota, Va. ..... 2.25@ 2.50
Michigan City, Ind. ..... .30@ .35
Mineral Ridge and Ohlton, Ohio 2.50
Oceanside, Calif. 3.00
Pittsburgh, Penn. ..... 3.00@ 4.00
Ridgway, Penn. 2.50
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md. 2.00
San Francisco, Calif. ..... 4.00@ 5.00
Silica, Va. ..... 2.25@ 2.50
St. Louis, Mo. 2.00
Sewanee, Tenn. 1.50
Thayers, Penn. 2.50
Utica, Ill. ..... .90@ 1.15

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Columbus, Ohio		.30@ 1.50
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	.65@ 1.25
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Erie, Pa.		1.00*		1.50*	1.75*	
Farmingdale, N. J.	.58	.48	.85	1.25	1.15	
Hartford, Conn.	.65*					
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	.90	1.00	.85	.85	.80
Portland, Me.		1.00	2.25		2.00	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Penn.		2.00				
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
York, Penn.	1.10	1.00				
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Barton, Wis. (f)		.50		.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio		.70	.70	.70	.70	
Des Moines, Ia.		.30	1.40	1.40	1.50	1.50
Eau Claire and Chippewa Falls, Wis.	.30@ .40	.40	.80@1.25	.90	.90	
Elkhart Lake, Wis.	.60	.60	.70	.70	.70	.60
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.		.60@ .70		.70@ .90		.70@ .90
Grand Rapids, Mich.		.50		.80	.80	.70
Hamilton, Ohio	.80@1.00	.80@1.00	.80@1.00		.80@1.00	.80@1.00
Hersey, Mich.		.50				.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Ia.	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Mattoon, Ill.	.75@ .85	.60@ .85	.85	.85	.85	.85
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .60	.40@ .60	1.25	1.25	1.25	1.25
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	.83	1.45	1.55a	1.45	1.45	1.45
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.25	1.25
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Charleston, W. Va. (b)			All sand, 1.40. All gravel, 1.40			
Brewster, Fla.	.60	.60	2.25			
Chattahoochie River, Fla.		.70		1.75		
Eustis, Fla.		.50@ .60				
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.25	1.25		1.20		1.20
Lindsay, Texas					.55	
Macon, Ga.		.50				
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		.80@ .90
Roseland, La.	.50	.50	1.25	1.50	.85	.85
WESTERN:						
Kansas City, Mo.		.70				
Los Angeles, Calif. (d)	.50	.50	1.10	1.10		1.10c
Oregon City, Ore.		1.50*	1.50*	1.50*	1.50*	1.50*
Phoenix, Ariz.	1.25*	1.25*	2.50*	2.00*	1.50*	1.25*
Pueblo, Colo.	.75	.60		1.15		1.20
San Diego, Calif.	.65@ .75	.65@ .75	1.50	1.30	1.10	1.10
Seattle, Wash. (bunkers)	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Chicago district, Ill.	.35					.65@1.00
Ferrysburg, Mich.						
East Hartford, Ohio	.75*					
Gainesville, Texas					.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					.55@ .65	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Joliet, Plainfield and Hammond, Ill.	.35	1.25				
Macon, Ga.	.35@ .50				.90	
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronts and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.	.35					
Somerset, Penn.		1.85@2.00		1.50@1.75		
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00				

(a) ⅝ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job by truck.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.
(g) ¾-in. and less.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.75	2.75	2.75	1.75@2.75	1.75	1.75@4.00	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75@2.25	1.75@2.25		1.75	2.00@2.50		1.75@2.00
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Columbus, Ohio	1.25@2.00	1.25@1.75	2.00@2.50	.30@1.50	2.00@2.50	2.75@3.50	1.50@3.00
Dresden, Ohio	1.50@1.75	1.50	1.75	1.25			
Eau Claire & Chippewa Falls, Wis.						3.00@4.00	
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Elnora, N. Y.			1.75				
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Pa.	2.00	2.00	2.25	2.00			
Klondike, Mo.	1.75@2.00		1.75@2.00	1.75@2.00	1.75@2.00		1.75
Mapleton Depot, Pa.	2.25	2.00		2.00			
Massillon, Ohio	2.25	2.25		2.50	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30@ .35	.30@ .35		
Millville, N. J.				1.75b		3.50	
Montoursville, Penn.				1.35@1.50			
New Lexington, O.	2.75	2.25					
Ohlton, Ohio	1.75b	1.75b		2.00b	1.75b	1.75b	
Ottawa, Ill.			2.50	1.25	.75	3.50	3.00
Ridgeway, Pa.	1.50	1.50	1.75@2.00c	2.50d			
Round Top, Md.	1.25			1.60		2.25	
San Francisco, Calif.	3.50	4.75	3.50	3.50@5.00	3.50@4.50	3.50@5.00	
Silica, Va.				10.00@16.00			
Thayers, Penn.	1.25	1.25		2.00			
Utica, Ill.¶	.50@ .75	.50@ .75		.50@ .75	.75		
Utica, Ill.	.90@1.15	.90@1.15	.90@1.15	.90@1.15	.90	3.00@3.50	.90@1.15
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	*1.75@2.25	*1.75@2.25	*1.75	*1.75@2.25	*1.75@2.25		
Zanesville, Ohio	2.00‡	1.50‡	2.00‡	2.00	2.00		

*Green. †Crude silica, crushed and screened, not washed or dried. ‡Plus 75c per ton for winter loading. ¶Crude. §Crude and dry. (a) Delivered. (b) Damp. (c) Shipped from Albany. (d) Delivered Buffalo or Black Rock.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium, Erie and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.75		1.50			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio		1.05*		1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.45*		1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.15e
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95d
Chazy, N. Y.		8.50	7.50	10.00		15.50$_9$	8.50	14.00
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00t
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65i
CENTRAL:								
Afton, Mich.							8.50	1.35
Carey, Ohio	12.50	8.50	8.00		9.00		8.00	2.00
Cold Springs, Ohio		8.50	8.50				8.00	
Delaware, Ohio		8.50	8.50	9.50	8.25$_7$	14.03$_7$	7.50	1.50c
Frederick, Md.		10.00	10.00	10.00	8.50	10.00	7.00	
Gibsonburg, Ohio	12.50	8.50	8.50		9.00	11.00	8.00	
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio	12.50							
Marblehead, Ohio		8.50	8.50		9.00		8.00	1.50w
Milltown, Ind.		9.00@10.00		10.00p			8.50q	1.40r
Sheboygan, Wis.	11.50				9.50		9.50	
Wisconsin points (f)		11.50					9.50	
Woodville, Ohio	12.50	8.50	8.50	13.50$_8$			8.00	1.50c
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	1.50
Graystone, Ala.	12.50	10.00					8.50	1.50
Keystone, Ala.		10.00	10.00	10.00	8.50			1.50
Knoxville, Tenn.	20.25	8.00	8.00	8.00	7.00		7.00	1.25
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.	14.00	13.00	12.00	13.00			12.00	1.70
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Dittlinger, Tex.		12.00@13.00					9.50p	1.50$_4$
San Francisco, Calif.	21.00	19.00	16.50				14.00	2.00
Tehachapi, Calif.			8.00				13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

†50-lb. paper bags; (a) net ton; (c) wooden, steel 1.70; (d) steel; (e) per 180-lb. barrel; (f) dealers' prices, net 30 days less 25c disc. per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days; (i) 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65; (p) to 11.00; (q) to 8.75; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood. steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (1) to 10.00; ($_1$) 80-lb. paper bags; ($_2$) to 3.00; ($_3$) to 9.00; ($_4$) to 1.60. ($_5$) to 16.00; ($_6$) wood bbl., steel, 1.80; ($_7$) quoted f.o.b. Marble Cliff, Ohio; ($_8$) superfine; ($_9$) barrels.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Mapleton Depot, Penn.	2.00	2.00@ 2.25
Massillon, Ohio		2.25
Michigan City, Ind. (Engine sand)		.20@ .30
Mineral Ridge, Ohio	*1.75	*1.75
Montoursville, Penn.		1.00@ 1.10
Ohlton, Ohio	1.80	1.80
Ottawa. Ill.	1.25	1.25
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50@ 4.50	3.50@ 4.50
Thayers, Penn.		2.25
Utica, Ill.	†.90	.90
Warwick, Ohio		2.25
Zanesville, Ohio		2.50

*Wet. †Fine; coarse dry, 3.00@3.50.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons, per gross	.08 1.00@ 1.50
Chatsworth, Ga.:	
Crude talc	4.00@ 5.00
Ground talc (20-50 mesh)	6.00@ 8.00
Ground talc (150-200 mesh)	6.00@12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.00
Misc. (cubes, blanks, chalk, etc.), per lb.	.10@ .20
Chester, Vt.:	
Crude talc	3.50@ 4.00
Ground talc (150-200 mesh), bulk	8.00@ 9.00
Including bags	9.00@10.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bulk	7.75@14.00
Joliet, Ill.:	
Roofing talc, bags	12.00
Ground talc (200 mesh), bags	30.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%..	3.75@ 4.25
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee—F.O.B. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 65-70%..	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 65%	*8.00
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

*With premium of 20c per ton for each 1% over 65%, and corresponding deduction, if any.

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, F.O.B. plant or nearest shipping point.

Pringle. S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—per ton,	
Mine run	360.00
Clean shop scrap	24.00
Mine scrap	20.00
20 mesh	30.00
60 mesh	37.00
100 mesh	45.00
Roofing mica	35.00
Punch mica, per lb.	.12

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	.....	10.50
Brandon, Vt.—English pink, English cream and coral pink	*11.00	*11.00
Brandon grey	*11.00	*11.00
Brighton, Tenn.—Pink..	6.00	5.00
Mixed pink and bronze	4.50@ 6.00	4.50@ 6.00
All colors, mixed sizes	3.50	3.50
Buckingham, Que.—Buff stucco dash	.....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries	.....	17.50
Crown Point, N. Y.—Mica spar	.....	9.00@10.00
Dayton, Ohio	.....	6.00@24.00
Easton, Penn., and Phillipsburg, N. J.	.....	12.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash	.....	6.00@16.00
Middlebrook, Mo.—Red	.....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	.....	5.50
Milwaukee, Wis.	.....	14.00@34.00
Newark, N. J.—Roofing granules	.....	7.50
New York, N. Y.—Red and yellow Verona	.....	32.00
Red Granite, Wis.	.....	7.50
Stockton, Calif. — "Natrock" roofing grits	.....	12.00@15.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	.....
Wauwatosa, Wis.	.....	20.00@32.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 17.00.
*C.L. including bags; L.C.L. 14.50
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk	19.00
Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% through 60 mesh, bags	16.00
96% thru 150 mesh, bags	30.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 98.50% thru 200 mesh, bags, 16.90; bulk	15.50
Glen Tay Station, Ont., color, red or pink; analysis: K_2O, 12.81%, crude (bulk)	7.00
Keystone, S. D.—Prime white, bulk (crude)	8.00
Los Angeles, Calif. — Color, white; analysis, K_2O, 12.16; Na_2O, 1.53; SiO_2, 65.60; Fe_2O_3, .10; Al_2O_3, 19.20; crude	10.00
Pulverized, 95% thru 200 mesh; bags, 22.00; bulk	20.00
For glass manufacturers — (F. o. b. C.L., sacks included): Grade A: Analysis, Al_2O_3, 19.20; Fe_2O_3, .10— Grade B: Analysis, Al_2O_3, 18.94; Fe_2O_3, .10	20.48
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	18.33 20.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Spruce Point, N. C., and Bristol, Tenn.—Color, white; 90% thru 200 mesh, bulk	12.50@20.00
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 65% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Topsham, Me.—98% thru 140 mesh, bulk	19.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude..	7.50@ 8.00

Chicken Grits

Afton Mich. (limestone) per ton	10.00
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt., per ton	10.00
Cartersville, Ga.—(Limestone), per bag	2.00
Centerville, Iowa (gypsum) per ton	18.00
Chico, Texas (limestone), 100 lb. bags, per ton	8.00@ 9.00
Danbury, Conn. (limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—per bag	1.25
Los Angeles, Calif. (feldspar) per ton	15.00
Gypsum, Ohio.—(Gypsum) per ton	10.00
Limestone, Wash. (limestone) per ton	12.50
Rocky Point, Va. (limestone) 100 lb. bags, 50c; sacks, per ton, 6.00 bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	12.00
Warren, N. H.—(Mica) per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone) bulk	‡7.50@*9.00
Wisconsin Points (limestone) per ton	9.00

*L.C.L. †Less than 5-ton lots. ‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50@13.00b
Boston, Mass.	*17.00
Brighton, N. Y.	*19.75
Dayton, Ohio	12.00@13.50
Detroit, Mich.	*17.50
Farmington, Conn	13.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	*19.00
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	10.00@15.00
Lancaster, N. Y.	12.50
Madison, Wis.	a12.50
Michigan City, Ind.	11.00
Milwaukee, Wis.	*13.00
Minneapolis and St. Paul, Minn.	13.00
Minnesota Transfer	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.00@13.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	*19.75
Saginaw, Mich.	13.00
San Antonio, Texas	16.00
Sebewaing, Mich.	12.00
Sioux Falls, S. Dak.	13.00c
Syracuse, N. Y.	18.00@20.00*
Toronto, Canada, 13.00	15.00*@15.60*
Toronto, Canada	13.00@15.60*
Wilkinson, Fla.	10.00@12.00
Winnipeg, Canada	*15.00

*Delivered on job. †Delivered in city.
‡Less 5%. *Dealers' price. (a) Less .50 E.O.M. 10 days. (b) Delivered to Milwaukee. (c) Delivered at yard.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.86¾	3.47
Atlanta, Ga.	.....	2.35
Baltimore, Md.	.....	2.25
Birmingham, Ala.	.....	2.30
Boston, Mass.	.....	2.23
Buffalo, N. Y.	.....	2.30
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	.....	2.24
Charleston, S. C.	.....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.....	2.32
Cleveland, Ohio	.....	2.24
Chicago, Ill.	.....	2.05
Columbus, Ohio	.....	2.29
Concrete, Wash.	.....	2.35
Dallas, Texas	.....	2.10
Davenport, Iowa	.....	2.24
Dayton, Ohio	.....	2.33
Denver, Colo.	.66¼	2.65
Detroit, Mich.	.....	2.15
Duluth, Minn.	.....	2.04
Houston, Texas	.....	2.60
Indianapolis, Ind.	.....	2.19
Jackson, Miss.	.....	2.60
Jacksonville, Fla.	.....	2.20
Jersey City, N. J.	.....	2.13
Kansas City, Mo.	.....	1.92
Los Angeles, Calif.	.62½	2.70
Louisville, Ky.	.54¼	.....
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.....	2.20
Minneapolis, Minn.	.....	2.22
Montreal, Que.	.....	1.36
New Orleans, La.	.....	2.20
New York, N. Y.	.....	2.03
Norfolk, Va.	.....	2.17
Oklahoma City, Okla.	.....	2.46
Omaha, Neb.	.....	2.36
Peoria, Ill.	.....	2.22
Philadelphia, Penn.	.....	2.21
Phoenix, Ariz.	.81½	3.26
Pittsburgh, Penn.	.....	2.04
Portland, Colo.	.....	2.80
Portland, Ore.	.62½	2.50‡
Reno, Nevada	.....	2.91
Richmond, Va.	.....	2.40
Salt Lake, Utah	.70¼	2.81
San Francisco, Calif.	.....	2.21
Savannah, Ga.	.....	2.50
St. Louis, Mo.	.....	2.05
St. Paul, Minn.	.....	2.22
Seattle, Wash.	.....	2.65
Tampa, Fla.	.....	2.25
Toledo, Ohio	.....	2.20
Topeka, Kans.	.....	2.41
Tulsa, Okla.	.....	2.33
Wheeling, W. Va.	.....	2.12
Winston-Salem, N. C.	.....	2.78

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.
‡Less 5c bbl. 10 days.
*Ten cents discount for cash, 10 days. (a) Price includes sacks.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	.....	1.80
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.05
Detroit, Mich.	.....	2.15
Hannibal, Mo.	.....	1.85
Hudson, N. Y.	.....	1.95
Leeds, Ala.	.....	1.95
Mildred, Kans.	.....	2.35
Nazareth, Penn.	.....	1.95
Northampton, Penn.	.....	1.85
Richard City, Tenn.	.....	2.05
Steelton, Minn.	.....	1.85
Toledo, Ohio	.....	2.20
Universal, Penn.	.....	1.80

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	—Plaster Board— ½x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ½x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev. and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Ia.	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00@11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	.....	.....	8.00	.....	8.25@9.40	.....	.....	.14½s	.15½s	40.00@41.00
Douglas, Ariz.	.....	.....	6.00	.....	.....	.....	15.00	.....	40.00	13.50	35.00	45.00	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	24.55	20.00	.....	.....	.....
Gypsum, Ohio	3.00	4.00	6.00	8.00	9.00	9.00	20.00	7.00	27.00	19.00	.....	15.00	30.00
Los Angeles, Calif.	.....	.....	7.50y	11.50y	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	11.65m	13.40r	14.40r	.....	15.40r	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.60	11.00	11.00	12.00	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	21.50	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross; (d) hair fibre; (g) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50; (u) includes sacks; (v) F.O.B. N. Y. C. and dealer's yard in mill locality; (x) Hardwall plaster; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	.16@.18a	.....	.....
Detroit, Mich.	.16	.....	.18
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	12.00	.....	.....
Graettinger, Iowa	.18@.20	.....	.....
Indianapolis, Ind.	.13@.15†	.....	.....
Los Angeles, Calif.¶	5¼x3½x12—55.00	7¼x3½x12—65.00	
Oak Park, Ill.	18.00	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.20@.25	.....	.....
Tiskilwa, Ill.	.16@.18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton.

Cement Roofing Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated. Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00

Chicago, Ill.—per sq. 20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red and Orange	Green Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas.—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00

Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich	Per 1000
5x8x12	55.00
Detroit, Mich.	Per 100
5x4x12	4.50
5x8x12	8.00
Longview, Wash.	Per 1000
4x6x12	52.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone-Tile)	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.—8x8, per 100	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile)	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.	14.00 22.50@27.00
Yakima, Wash.—Building tile:	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis.	15.00	28.00@50.00
Mt. Pleasant, N. Y.		14.00@23.00
Oak Park, Ill.	25.00	40.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	15.00	20.00
Portland, Ore.	17.50@19.50	25.00@75.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	23.00
Rapid City, S. D.	18.00	25.00@80.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	15.00	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

†Gray. ‡Red.

Seattle Concrete Pipe Company Acquires Fourth Plant

A RECENT report in the Shelton (Wash.) *Mason County Journal* announces the sale of the Shelton Concrete Co., Shelton, by F. C. Willey to the Concrete Pipe Co. of Seattle, which also operates plants in Tacoma and Centralia. The Seattle company, it is said, will expand the Shelton plant.

The plant is already well equipped with forms for making a great variety of products, but whatever is required to meet the needs of the local building demand will be added.

Tom Stoy, manager of the Centralia Concrete Pipe Co. plant, will have general supervision over the Shelton plant, but Dean Carmen will be the local superintendent.

Onondaga County, N. Y., Gets Bids on Cement

ONONDAGA County, New York, will buy cement at the lowest prices in years this summer, according to bids received recently by County Purchasing Agent Frank X. Wood. Of ten bidders who wanted to supply the county with 70,000 bbl. of cement, the Syracuse Wall Plaster Co. was the lowest with an offer of $2.36 per bbl. This is a drop of 20 cents per bbl. over the prices paid a year ago.—*Syracuse (N. Y.) Journal.*

Indiana Cement Bids

SIXTEEN cement firms, submitting bids February 1 on approximately 1,000,000 bbl. of cement to be used by the Indiana state highway department in 1927, indicated that cement to be used this year will cost about $1.65 per bbl., or 10 cents per bbl. less than last year. This cement is brought direct from the producing mills. The highway department last year used 700,000 bbl. at a cost of about $1.75 per bbl. Bids reflected a recent reduction in the price of cement, but the contract will not be awarded until all bids are studied, according to John D. Williams, director of the commission. The bids quoted an average gross price of $2.15 per bbl., but the discount for cash payment and refund on sacks will bring the price much below this figure.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	----	.40	.50	.60	.70	.....	.....	.....	.....	.....	.....	----
G'd Rapids, Mich. (b)																	
Culvert pipe	.....	.....	.....	.60	.72	1.00	1.28	1.60†	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	----
Sewer pipe	.11	.15	.25	.29	.38	.59	1.00	1.26†	.....	1.89	.....	.....	.....	.....	.....	.....	----
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	†1.70	2.20	.....	.....	.....	.....	.....	.....	----
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	----
Longview, Wash.								Sewer pipe 40% off list, culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	----
Newark, N. J.								6 in. to 24 in., $18.00 per ton									
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	----
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	----
Tiskilwa, Ill. (rein.) (a)	.....	.....	.....	.65	.75	.85	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	----
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Yakima, Wash.								$10.00 per ton									

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced.
†21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. ¹@1.08. ²@1.25. ³@1.65. ⁴@2.50. ⁵@3.85. ⁶@5.00. ⁷@7.50.

Ordinary and Special Hot Zone Rotary Kiln Linings Compared

ONE of the Ohio portland cement companies operates five 6 x 120 ft. and two 8 x 125 ft. rotary kilns fired with pulverized coal. The temperature in the hot zone is between 2,400 and 2,800 deg. F. The kilns operate 24 hours a day and seven days a week throughout the year, except for a period of about six weeks each year when the plant is shut down for repairs.

Since the life of kiln linings is influenced both by the nature of the refractories and the method of installing the brick, care has been taken to insure the selection of high grade refractories and the use of good workmanship in laying the brick.

Refractories Used; Comparative Life; Comparative Lining Costs

About four years ago this company began to use Harbison-Walker special rotary kiln blocks in place of the ordinary fireclay brick, which had been used up to that time. The 6-in. blocks are now used in the hot zones of the 6 x 120 ft. kilns, and the 9-in. blocks are employed for the 8 x 125 ft. kilns. The hot zones are about 40 ft. in length.

With these special rotary kiln blocks the average life of a lining in the hot zone is six months, and one kiln made a record of 11 months. Ordinary fireclay brick lasted an average of three months before patching was necessary.

The difference is due, not only to the greater ability of the special blocks to withstand high temperatures, but also to the fact that the burner is able to hold his scale much better, resulting in less rapid abrasion.

The attached tabulations show the comparative annual costs of lining the hot zones with the two materials. The cost of the original lining is distributed over a 10-year period. Two repairs per year are allowed with the special blocks and four repairs with ordinary fireclay brick. Refractory material, labor, fireclay and cement are included in both cases.

The results, calculated for one 6x120-ft. kiln, are as follows:

Annual lining cost—ordinary fireclay brick	$313.80
Annual lining cost—H. W. special rotary kiln blocks	218.80
Net saving in lining cost, per year	$ 95.00
Cost per ton of clinker—ordinary fireclay brick	$.00975
Cost per ton of clinker—H. W. special rotary kiln blocks	.00680
Net saving, per ton of clinker	$.00295
Per cent reduction in lining cost	30%

A still greater saving is realized through the reduction in time required for patching refractories. A shutdown involves an average loss of 36 hours, and, since the use of the special blocks has reduced the number of shutdowns from four to two per year, it is saving about 72 hours annually.

Since cement production is a continuous process, the effect of lost kiln time is ordinarily considered to curtail production without decreasing any expense other than for raw material, coal and power. Therefore it is customary to evaluate lost kiln time at from $10 to $15 an hour. Using the lower value of $10, the yearly saving on this item is $720 per kiln.

Comparative Ultimate Cost

The total annual saving is $815 for each of the smaller kilns. The saving on each of the larger kilns is obviously fully as great; hence it is conservative to calculate the total saving for the seven kilns at $5,705 a year.

COST OF LINING HOT ZONE OF 6x120 FT. KILN WITH H. W. SPECIAL ROTARY KILN BLOCKS

Original lining:		
Material—		
3000 H. W. special rotary kiln 6 in. blocks @ $0.12		$360.00
Labor—		
1 mason × 40 hrs. @ $0.60	$24.00	
2 helpers × 40 hrs. @ $0.40	32.00	
		$ 56.00
Fireclay and cement		12.00
Total original cost		$428.00
*Cost per year—$428 ÷ 10 years		$ 42.80
First repair:		
Material—		
600 H. W. special rotary kiln 6 in. blocks @ $0.12		$72.00
Labor—		
1 mason × 10 hrs. × $0.60	$6.00	
2 helpers × 10 hrs. × $0.40	8.00	
		$14.00
Fireclay and cement		2.00
		$88.00
Second repair: Same as first		88.00
Total cost of lining, per year		$218.80
Total cost per day—$218.80 ÷ 322 days		$ .680
Average cost per ton of clinker produced—$0.680 ÷ 100 tons		$.00680

*Theoretically this is done once during life of kiln.

COST OF LINING HOT ZONE OF 6x120 FT. KILN WITH ORDINARY FIRECLAY BRICK

Original lining:		
Material—		
3000 brick@$0.09		$270.00
Labor—1 mason × 40 hr. × $0.60	$24.00	
2 helpers × 40 hr. × $0.40	32.00	
		56.00
Fireclay and cement		12.00
Total original cost		$338.00
*Cost per year—$338.00 ÷ 10 years		$ 33.80
Fire repair:		
Material—		
600 brick@$0.09		$ 54.00
Labor—		
1 mason × 10 hrs. × $0.60	$6.00	
2 helpers × 10 hrs. × $0.40	8.00	
		$14.00
Fireclay and cement		2.00
		$70.00
Second, third and fourth repairs: Same as first—3 × $70		210.00
Total cost of lining per year		$313.80
Total cost per day—$313.80 ÷ 322 days		.975
Average cost per ton of clinker produced—$0.975 ÷ 100 tons		$.00975

*Theoretically this is done once during life of kiln.

SAVING EFFECTED BY H. W. SPECIAL ROTARY KILN BLOCKS IN HOT ZONE OF 6x120 FT. KILN

Cost per year—ordinary fireclay brick		$ 313.80
Cost per year—H. W. special rotary kiln blocks		218.80
Net saving in lining cost, per year		$ 95.00
Saving in productive time—		
Shutdowns with ordinary fireclay brick 4 × 36 hr.	144 hr.	
Shutdowns with H. W. special rotary kiln blocks—2 × 36 hours.	72 hr.	
Net saving in productive time	72 hr.	
Value of saving, per year: 72 hours × $10.00		720.00
Total saving per yr.—1 kiln		$ 815.00
Total saving per yr.—7 kilns—7×$815.00		5,705.00
Lining cost per ton of clinker—		
Ordinary fireclay brick		$0.00975
H. W. special rotary kiln blocks		.00680
Net saving in lining cost per ton of clinker		$0.00292
Per cent reduction in lining cost		30%

(Survey made by A. C. Nielsen Company, engineers, in collaboration with and approved by the general superintendent of an Ohio portland cement company.)

Analysis of Lime by New Method

A METHOD for analyzing hydrated lime has been recently developed at the Bureau of Standards by which more information is obtained than the usual chemical analysis.

The method consists, briefly, in heating a sample of the material in question, which may be a hydrated lime, mortar or similar material, at succeeding temperatures for short periods of time, determining the loss in weight after each heating.

From the data thus obtained a curve, temperature against loss in weight, is plotted. In this curve sudden changes in direction appear, from which the loss in weight due to various compounds may be determined, and from which the percentages of these compounds themselves are readily calculated. By this means it is possible to determine the percentages of calcium hydroxide and magnesium hydroxide, and to a certain extent also calcium carbonate, in such a material.

Using this method a considerable number of commercial hydrated magnesian limes have been studied, and it has been found that the magnesia content is, in general, hydrated to only a very high extent; in other words, very little magnesium hydroxide is present. The magnesia, however, does combine with water in time, indicating that improved methods of treatment may possibly give a material in which all the magnesia appears as hydroxide.

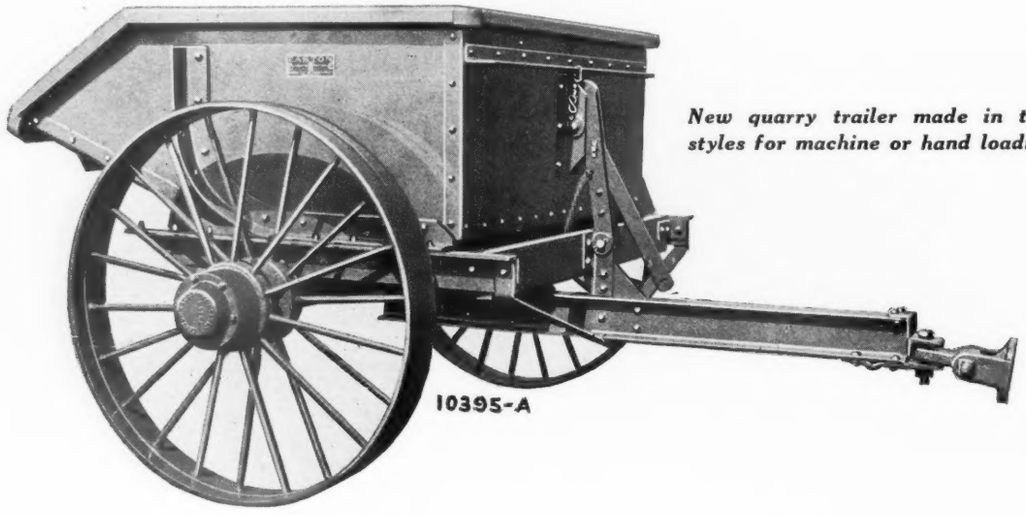
A New House Organ

THE Armstrong Manufacturing Co., Waterloo, Iowa, has just issued the inaugural number of its new house organ, *The Armstrong Driller*. The issue is divided into two sections, one devoted to blast hole drilling and the other to water wells and equipment for sinking them. Included in the articles are discussions on winter drilling with big drills, operating costs of drilling machines and the development of the portable well drill, all of which are interesting to quarrymen or others who use drilling equipment.

New Machinery and Equipment

New Tractor Trailer for Use in Quarries

EASTON Car and Construction Co., Easton, Penn., has made several improvements in its quarry tractor trailers for transportation of quarry strippings and general use. The trailers are of 4 cu. yd. capacity and constructed in either of two body designs. One of these is for shovel, hopper or machine loading and the other for hand loading to facilitate work where it is not convenient to use a shovel. This latter unit has a height of only 34 in. from the ground level. All-steel construction is a feature of these trailers.



New quarry trailer made in two styles for machine or hand loading

New Control for Cableway Excavators

THE Page Engineering Co. of Chicago has recently brought out a device which is claimed to improve the operation of their slackline cableway excavator. It is said to give the operator a great control over the dumping of the bucket than devices formerly used. It is described by the makers as follows:

"The Page cableway control differs from other devices in that the bucket is locked in position above the hopper grizzly in such a manner that it dumps by gravity. While locked in this dumping position, the operator can shake the bucket at will in order to free it of any sticky material. The bucket is released by a short forward pull. The operation of the locking device is automatic, being performed by an arm that is locked in a device resembling a boot-jack. The release is also automatic. It is positive, as the bucket always locks in position when the carriage and the arm on the lock meet and it is released by a short forward pull on the bucket.

"If the load cable is released quickly, the bucket will dump quickly. If it is released slowly, the load will be dumped as slowly as the operator desires. The ability to hold the bucket and to shake it at will above the hopper grizzly appeals to slackline cableway users.

New 1¼-Yd. Power Shovel of Convertible Type

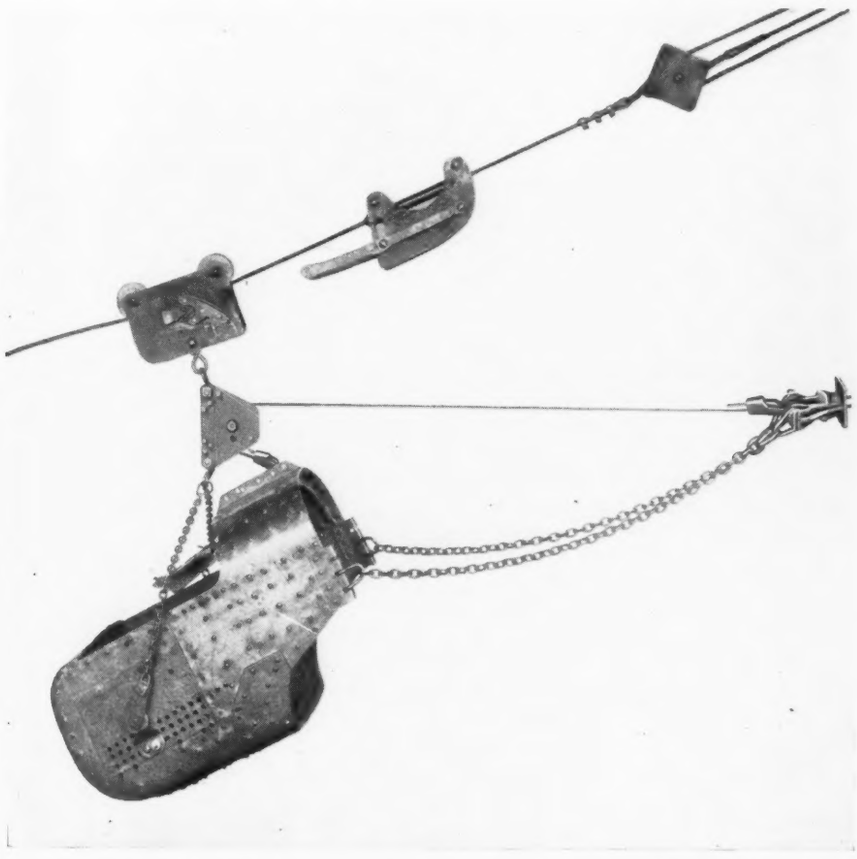
A NEW power shovel of 1¼-cu. yd. capacity, known as Model K-42, is now being produced by the Link-Belt Co., Chicago, Ill. The new design, the manufacturers state, includes oversize brakes, clutches, drums and other working parts which permit capacity operation under all conditions.

All rope speed changes in the new shovel are taken care of by changing the drum shells, to vary the drum diameter, and by changing the engine pinion. In this way the machine, it is said, can quickly and easily be converted to dragline, crane or trench shovel. The necessary appurtenances for the conversion, such as the boom for the dragline or general crane service, are available.

Strength, ruggedness, flexibility, speed of operation, oversize working parts, and large capacity are the special features claimed for the new Link-Belt K-42.

New design of 1 1/4-yd. power shovel readily converted to dragline or crane

"Stripping operations can be handled with the Page bucket without the aid of a tripping or locking device. Therefore, this bucket is especially desirable for that class of work as it increases the speed of operation. All that is necessary in stripping is to release the load line when the desired point at which the bucket is to dump is reached. The bucket dumps immediately by gravity when the tension on the load line is released."



The cableway bucket is locked in the dumping position so that the bucket may be shaken

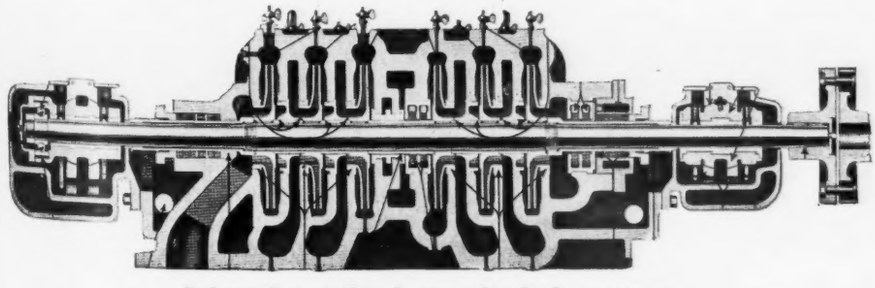
New High Pressure Boiler Feed Pump

ONE of the most recent developments in high-pressure boiler feed pumps was shown by the Pennsylvania Pump and Compressor Co., Easton, Penn., at the New York Power Show. The pump, a 3-in. six-stage type, is suitable for boiler pressures of from 300 to 500 lb. per sq. in. and its design is said to embody many new and desirable features.

The opposed arrangement of impellers, the manufacturers say, provides a pump which is practically balanced, hydraulically, eliminating the need of heavy thrust bearings.

In the selection of materials, care was taken to use those which would best meet the requirements of boiler feed service, as is shown from the fact that the impeller wearing rings, shaft sleeves and shaft bushings are of Monel metal and the impellers and casing wearing rings of bronze.

Pure carbon packing is used at high pressure seals, while all internal stationary parts are held in place against rotation and axial movement by means of lugs and shoulders without the use of pins, screws or dowels.

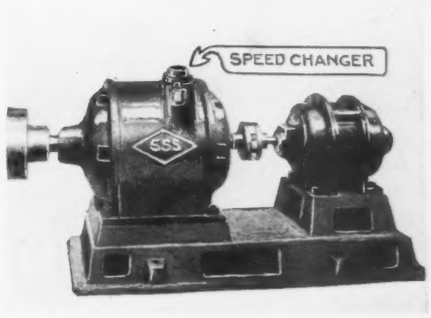


Balanced centrifugal pump for high pressures

New Variable Speed Reducer

A NEW type of speed reducer for variable speed drives on equipment such as cement mills, conveyors, rotary driers, automatic stokers and other machinery has been recently brought out by William E. Simpson, 100 Morgan Bldg., Detroit, Mich. The machine is a single compact closed unit.

Each unit comprises two reductions only, the first being a modified worm movement with variable ratio and the other a train of spur gearing adapted to take the heavy torque and shock of the slow speed end.



Reducer for variable speed drives

Some of the advantages claimed for the new machine are: Instantly adjustable ratios from 10:1 to 1000:1 by setting of dial to the required speed, flexibility of control with constant speed, great starting effort which makes unnecessary an oversize motor, improved power factor allowing the use of steady running squirrel motors for any job, automatic regenerative oiling system and adjustable tapered roller bearings. The reducer, the manufacturers say, will operate silently and efficiently at motor speeds up to 3600 r.p.m.

The design of the speed-unit is said to be adaptable to different service conditions. It may be mounted on floor, wall or ceiling, as desired. The present designs include a right angle drive with slow speed shaft either vertical or horizontal and close-coupled type combined with motor. Parts are said to be easily accessible and interchangeable with machines of different sizes.

Dings Wins Title to Patent

A MANDATORY injunction decreed by the U. S. District Court of the Eastern District of Wisconsin in favor of the Dings Magnetic Separator Co. of Milwaukee was affirmed by the U. S. Court of Appeals on January 18 without modification.

This injunction restrains a competitor from building ventilated magnetic pulleys which infringe patent No. 1,369,516 and is the result of an action brought by the Dings company against a manufacutrer of magnetic pulleys. The suit which has now been decided in favor of the Dings Magnetic Separator Co. establishes the fact that this company is the owner of the patent on ventilated pulleys and that others offering that construction are infringing.

Nova Scotian Gypsum Industry

HANTS County, Nova Scotia, led all Canada in 1926 in gypsum production, exporting in all 650,000 tons, valued at about $1,500,000. These operations, though they have been carried on a great number of years, have made great progress the last year or two.

The largest operations in the country are carried on by the Canadian Gypsum Co. at Wentworth, about two miles from Windsor, where the company has large holdings of gypsum-bearing property, and operates two main quarries, "The Cables" and "Meadow Quarry." The method of operation is open mining entirely.

"The Cables" is the chief producer and is nearly 1000 ft. long, about 500 ft. wide and 80 ft. deep. The deposit is overlaid with an overburden of about 8 ft. After stripping holes sometimes as deep as 60 ft. are drilled and shot. The displaced gypsum rock is loaded on light railway cars running on an incline at the end of the quarry and hauled to the crushing plant at the shipping wharf. The quarry is kept clear of water by electrically driven pumps.

Material Crushed Before Shipping

At the crushing plant the loaded cars are automatically dumped into a jaw crusher of about 300 tons per hour capacity which reduces the rock to 3-in. size. The crushed rock passes to a conveyor belt and is taken to the storage building which has a capacity of 25,000 tons, and from there it goes through the loading chutes to the steamer as required. Formerly the gypsum was shipped by the company on its own barges, and towed to the Staten Island, N. Y., plaster mill by the company's tugs, but during the past year it was all shipped by freighters some of which carried 5000 tons. Specially built freighters will be built to replace these within a short time.

The Meadow quarry is located about one mile east of the Cables, and is somewhat smaller. There is very little overburden at all, the rock is loosened by blasting and is then loaded on the cars by gasoline shovels and taken to the crushing plant. There are different kinds of gypsum found in these quarries and in quarrying these kinds are kept separate.

The machinery at the crushing plant is run by a 260-hp. electric motor and a large part of the equipment used in connection with the operations is electrically driven, the power for which is secured from the Avon River Power Co.'s hydro development at Avon Falls. On the average the company employs about 600 men, and the quarries are operated during the entire year except for a short time during the winter. The demand during the past year has been so great that it has been necessary to run the quarries and crushing plant both day and night. Next year's shipments are expected to exceed that of 1926 by a good many thousand tons.

A large storage building in addition to the one already in use is in process of construction. When completed it will give the company storage facilities for over 50,000 tons, which will be filled during the winter months when navigation is closed.

Other large gypsum quarries are at Walton and have been operated by the Rock Plaster Co. for a number of years. This company has recently been absorbed by the Atlantic Gypsum Products Co., Boston, Mass., which has a gypsum mill under construction at Portsmouth, N. H. The operations at the Walton quarry are to be greatly extended during the coming year.

Quarrying at Walton is all open face, with little overburden. The gypsum rock is loosened by blasting and loaded in dump carts which are taken to the crusher situated at the pier, where it is crushed and conveyed to the storage building of about 4000 tons' capacity. From storage it is loaded into the cargo steamers by a conveyor belt, and shipped to the New York plaster mills. Some of it is shipped to Norfolk where it is used in the manufacture of fertilizer. The machinery is at present run by steam, generated by coal, but it is anticipated that this will be replaced in the near future by electrical machinery.

The Cheverie quarries are close to the government wharf. All the mining is done by hand and the rock is broken into pieces for easy handling. Practically all of it is shipped in sailing vessels. There is a good demand for rock from this quarry and work has continued throughout the present winter.

The Windsor Quarries

Windsor Gypsum Co.'s quarry is located a short distance from Newport station. Quarrying is done by hand and the rock loaded on flat cars and taken to the shipping point at Windsor, where it is transferred to foreign boats and taken to Newburg, N. Y. The gypsum from this quarry is of high grade and is used chiefly for the manufacture of plaster of paris in connection with the dental trade, confectioners' molds, statuary and architectural work. The company is not planning any special development for the coming year, but anticipate that a slightly larger quantity of gypsum will be quarried than in the past year. Miss Effie Mosher, of Windsor, is the manager of this company.

Windsor Plaster Co. operates two small quarries, one at Clarkesville and the other on the outskirts of Windsor. The gypsum from these quarries is taken to the mill at Windsor, where it is manufactured into hard wall plaster. The company's products are sold throughout the Maritime Provinces and some has been shipped as far west as Montreal. The plant operates the year round. C. Henry Dimock and Jesse P. Smith are the owners of this plant.

European Superphosphate Trust

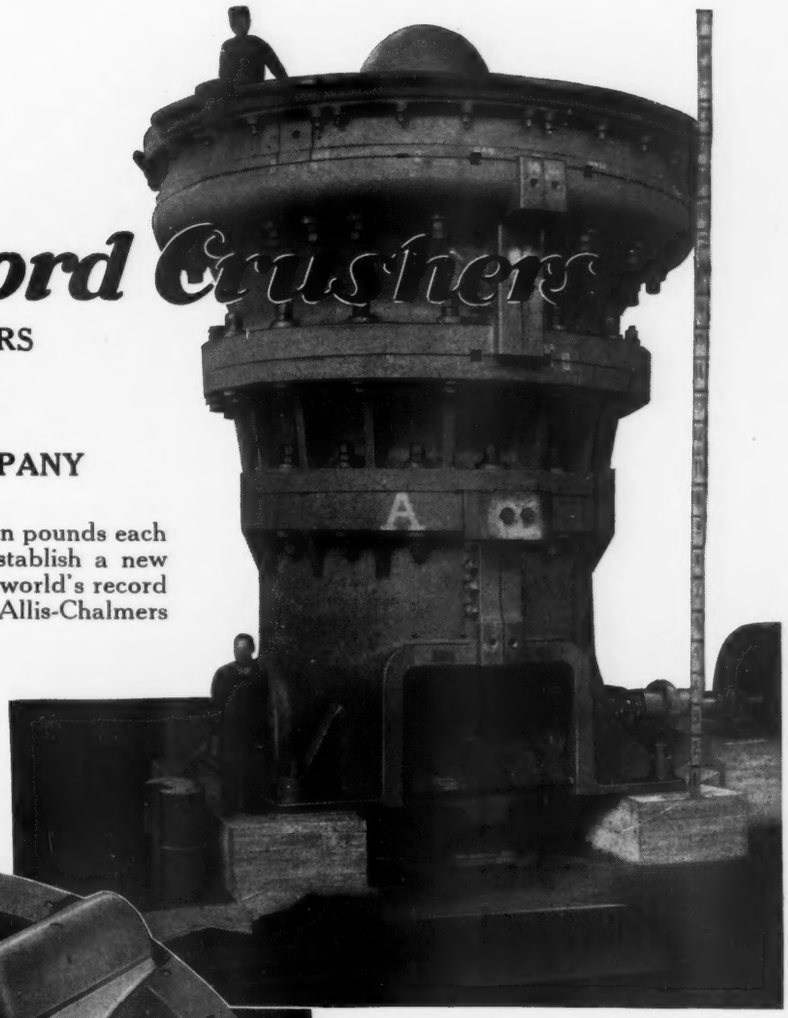
IN the current news of the day is a report of the formation of a general superphosphate trust which includes various European countries, French, North Africa, and British South Africa. The organization proposes to prosecute research and study of the phosphoric acid and superphosphate business, with relation to substitute fertilizer materials and synthetic fertilizers said to have been invented by German interests. Such an organization is symptomatic of the times. Protection of raw materials markets and their expansion is now apparently essential in many lines and is a fundamental, modern phase of agriculture. The independent private operator, be he farmer or producer of raw fertilizer materials, is at a disadvantage when it is necessary to compete against an organized business. Such is the status of a number of non-metallic products. Expense for research, if undertaken by an independent producer, is not justified unless he can secure adequate protection for his novelties, which is not always the case. It is therefore beneficial to combine with other producers and share the expense for research, development of new uses, and the securing of marketing information. The general superphosphate trust, referred to before, is merely another manifestation of the principle described.—*Engineering and Mining Journal.*

National Agstone Officers Elected for 1927

IN the report of the 10th annual convention of the National Crushed Stone Association, given in the January 22 issue of ROCK PRODUCTS, a detailed account of the luncheon of the National Agstone Association group was given. This report gave the papers presented by speakers of national reputation on the various topics connected with the purely technical side of the industry.

In a second luncheon meeting, held January 19, officers and directors for the ensuing year were elected. President Poorman made an excellent talk giving a resume of the work that had been accomplished during the year. He asked that someone else be given the presidency for the coming year but the members would not listen to him. Harry Brandon paid a well deserved tribute to Mr. Poorman's work in a brief speech and by unanimous vote the members induced Mr. Poorman to accept the position for another term. The same feeling was expressed toward F. J. Colgan, vice-president, and W. H. Margraf, secretary-treasurer, both being unanimously re-elected. The treasurer's report, read by F. J. Colgan, was unanimously adopted.

The new directors chosen (in addition to the officers mentioned) are: H. C. Krause, J. C. King, C. W. Fuller, H. J. Filer, Ellwood Gilbert, E. M. Lamkin, Harry Brandon, and N. G. Farber.



World's Record Crushers

60-INCH ALLIS-CHALMERS SUPERIOR McCULLY

All-Steel Gyratory Crushers

Built for

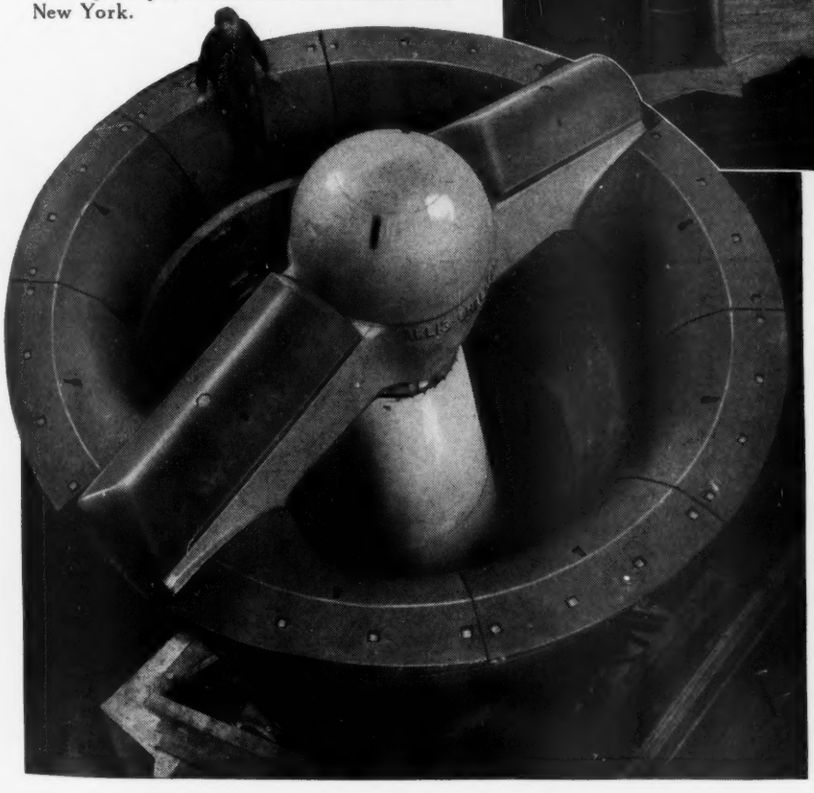
CHILE EXPLORATION COMPANY

Chuquicamata, Chile

These two crushers, which weigh a million pounds each and which are of all-steel construction, establish a new record for Gyratory Crushers and another world's record for the lines of heavy machinery built by Allis-Chalmers Manufacturing Company.

In spite of their extreme size and enormous weight they are sectionalized for transportation over a narrow gauge, mountain railroad to an altitude of 13¼ miles above sea level.

25 freight cars are required to handle the shipment of these two crushers and their spare parts between Milwaukee and New York.



The two hopper openings, each 5 feet across, permit a carload of ore weighing 70 tons to be dumped into the crusher at one time. Some pieces of the ore will weigh as much as seven tons. This will be reduced to a 12-inch product. Each crusher handles from 2000 to 2500 tons of ore per hour.

"The Story of the World's Record Crushers," a pamphlet telling of the problems of building and transporting these huge machines will be furnished on application to those interested. Address

Allis-Chalmers Manufacturing Co.
Dept. C-10 Milwaukee, Wis., U. S. A.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

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News of All the Industry

Incorporations

Mercedes Concrete Pipe Co., Mercedes, Texas, increased capital, $15,000 to $50,000.

Bowling Green Quarries Co., Bowling Green, Ky., increased capital, $150,000 to $1,000,000.

Star Sand and Gravel Co., Tacoma, Wash., $50,000. N. E. Robbins and S. Harold Shefleman.

Southern Tile Co., Dallas, Tex., $100,000. Thomas W. Griffiths, 918 South Lamar St., and others.

Seifert Ornamental Plaster Co., St. Louis, Mo., $10,000. Walter I. Seifert, 1928 McCausland St., and others.

River Falls Sand and Gravel Co., Inc., River Falls, Wis., $25,000. Frank H. Johnson, Alfred Blegen, and others.

Hunter Concrete Products Co., Inc., New York City, N. Y., $100,000. M. M. Lucey, Wilmington. (Colonial Charter Co.)

Indiana Concrete Pipe Co., Inc., Hammond, Ind. ,$50,000. Stephen A. Harriman, Sam L. Bayliss and Joseph L. Million.

Architectural Decorating Co., Seattle, Wash., $75,000. F. J. Hahn, F. H. Hahn, and others. To manufacture stone products.

Bellingham Concrete Producing Co., Bellingham, Wash., $5,000. Russell E. Lind, M. E. Henderson and James C. Benton.

North American Gypsum Co., Inc., New York, N. Y., $500,000. M. M. Lucey, Wilmington. Mineral lands. (Colonial Charter Co.)

Becker County Sand and Gravel Co., Inc., Brainerd, Minn., $50,000. F. E. Murphy, of Crosby, and M. W. Richards, of Brainerd.

Beaumont Sand and Gravel Co., Portland, Ore., $25,000. C. J. Nelson, David A. McGuirt. (Filed by O. G. Larson, 506 McKay Bldg., Portland.)

Glen Park Concrete Block Co., Gary, Ind., $10,000. B. A. Lucas, Mike Adleisch and Dorothy Adleisch. To deal in concrete building materials.

Pacific Porous Tile Corp., Los Angeles, Calif., $100,000. Frank J. Huseman, J. L. De Laney, J. E. Ware, E. L. Gribling and F. H. Reed, all of Glendale.

Chilhowee Stone Co., Knoxville, Tenn., $4,000. Charles M. Seymour, Empire Bldg., W. C. Anderson, A. L. Mason, C. A. Scheibel and Joseph W. Sullivan, Jr.

Indiana Limestone Co. of New York, Inc., New York City, N. Y. A. E. Dickinson, Michael Cohen, John Furlong, Lawrence N. Donihue and C. W. Nesbett.

West Paterson Sand and Gravel Co., Paterson, N. J., $100,000. Alex Shapiro, Reuben H. Reiffin, Jeannette M. Petrie, Paterson. (Atty., Reuben R. Reiffin, Paterson.)

Tidewater Bondholders' Corp., Manhattan, N. Y., 100 shares common, no par. M. Seimsen, A. B. Cohn, L. E. Bobker. Sand and gravel. (Filed by L. Oppenheimer, 60 Wall St.)

Huguenot Sand and Gravel Co., Richmond, N. Y. Co., N. Y., $100,000. P. G. R. Schramm, H. A. Conway. Sand, gravel, lime, cement, etc. (Filed by E. L. Sutton, Stapleton.)

Polysius Corp., New York City, N. Y., 1000 shares common, no par. R. G. Albrecht, W. J. Topken, H. G. Conway. Cement and plaster, (Filed by U. S. Corp. Co., 150 Broadway.)

Edmondson County Rock Asphalt Co., New York, N. Y., $250,000. W. P. Flack, S. R. Twyford, Butler, Penn.; James Moorehead, Zeilienople, Penn. (Corporation Trust Co. of Delaware.)

Kolon Products Co. of Delaware, $25,000; Kansas City, Mo., $25,000. J. O. Patterson, president; Roy K. Dietrich, secretary. To manufacture, buy, sell and deal in raw and calcined gypsum products.

Monmouth Washed Sand and Gravel, Inc., Freehold, N. J., $100,000. George E. Fournier, Anna M. Fournier, Armond J. Fournier, Middletown, N. J. Cement blocks. (Atty., Max Finegold, Freehold.)

Quarries

Michigan Limestone and Chemical Co., Calite, Mich., has placed an order for two 6-wheel, 80-ton switching engines with the Lima Locomotive Works, Lima, Ohio.

Phillips & Slack Granite Co., Northfield, Vt., is having plans prepared, it is said, for a machine shop to replace one destroyed by fire recently. Lifting equipment may be included in its requirements.

Sutton Brothers, Atlantic National Bank Bldg., Jacksonville, Fla., are erecting a rock crushing plant at Inverness, Fla., according to a report, and will put in machinery and equipment to cost about $30,000.

Frank E. Haynes, 73 Mountain St., Eureka Springs, Ark., is planning the establishment of a small rock crushing plant at that point.

Northwestern Limestone Co., Wilson, Wis., will open another quarry at Burkhardt, Wis., as soon as weather will permit in the spring. There is about twenty acres in this deposit, which is located on the Northwestern railroad between Burkhardt and New Richmond.

Elkin, N. C.—Plans are said to be under way for the organization of a company with a capital of $100,000 to develop the large deposits of dark granite located near here.

Plattsburg, Mo.—The Porter & Adams rock crushing plant located here was recently sold, according to reports, to a Mr. Bunting of Kansas City. The transaction was made at the trustees' sale. Eleven thousand dollars is said to have been the purchase price.

Indiana Limestone Co. of New York, Inc., has been organized under the laws of that state. A. E. Dickinson, president of the company, heads the organization, which is a subsidiary of the Indiana company. Michael Cohen is vice president; John Furlong, treasurer; Lawrence N. Donihue, secretary, and C. W. Nesbett, sales representative.

Ainslie Limerock Co., Cochran, Ga., is said to have contracted with the local electric company for the installation of a substation at its plant, calling for 1000 kw. of power, which will deliver 1500 hp. The line will run from Clinchfield to Ainslie and from that point to Cochran.

American Lime and Stone Co., Bellefonte, Penn., gave its annual dinner dance to all of its salaried employes on Saturday night, January 22. Invitations were also extended to the office employes of the Charles Warner Co. of Wilmington, Del., many of whom were present. A talk was given by Charles W. Warner, president of both companies.

Sand and Gravel

Giant Rock and Gravel Co., Fresno, Calif., held its annual meeting of stockholders and directors in San Francisco recently and re-elected H. M. Estes, president, and William S. Wilsey, secretary. Other officers and directors were re-elected as follows: F. B. Peterson, vice president; H. P. Hills and John S. Humburg.

C. E. Graebner was appointed by Judge D. V. Jackson as receiver for the Hahn-Muscatine Co., a gravel concern operating on Muscatine, Island, after the company joined with J. L. Giesler in a request for the appointment of a receiver, according to a report in the Davenport, Iowa, "Democrat." The company is incorporated for $500,000, of which $271,450 has been issued. Attorneys in the action are G. A. Allbee for Mr. Giesler and Thompson Thompson for the company.

Koch Sand and Gravel Co., Evansville, Ind., expects to replace the wooden barges it is using now with steel barges early in the spring, according to Bert Koenig, general manager. The order for the new barges has already been placed.

R. L. Maturi, Chisholm, Minn., has purchased the property of the Fay Sand and Gravel Co. at that point.

F. D. Hayden and associates are planning the establishment of a sand and gravel plant five miles west of Miles City, Mont., on the Northern Pacific R. R. They will have a 500-yd. capacity washing plant, industrial locomotive, steam shovel and half-mile of power line.

Winchester Sand and Gravel Co., Winchester, Ky., recently incorporated for $30,000, as announced in the last issue of "Rock Products," has acquired the Winchester Granite and Brick Co.'s holdings at Dudley, Rockcastle Co., it is reported. Plans are under consideration for erecting a crushing and pulverizing plant within the near future. A washing plant is now being installed and a steam shovel has been placed for quarry work. Officers of the new company are: J. C. Codell, president; R. D. Blanton, vice president, and H. C. McNeill, secretary-treasurer.

Laura Gravel and Stone Co., Dayton, Ohio, at its eighth annual meeting held in Potsdam recently, elected the following officers: Edward C. Mattis, president; Lites Besecker, vice president; I. E. Baker, secretary-treasurer and general manager; Roger Baker, assistant secretary and treasurer; directors, Walter J. Steiner, Glen Idle, and Bob Kraus. The company is now installing machinery, it is said, to increase its present capacity of 700 tons per day.

Lime

Falling Spring Lime Co., Inc., Covington, Va., said to have 100 acres under development at Barber, Va., is planning later on to increase the present daily output of the quarry and plant from 400 tons to 1000 tons by constructing a new plant. All machinery is to be operated by hydro-electric power, already developed. Guy G. Buell is manager.

Chipley Lime Products, Inc., Tallahassee, Fla., recently incorporated for $40,000, as announced in the last issue of "Rock Products," has acquired 200 acres of lime rock deposits in Washington county and, according to a report, contemplates the early construction of a crushing plant. A steam shovel, locomotive drills and other machinery for development will be installed. A. R. Richardson is president.

Gypsum

United States Gypsum Co., Chicago, Ill., is making arrangements for the final meeting of the Foremen's Round Table, composed of the officials and department heads of the company's plant at New Brighton, N. Y. The meeting will be a social affair with a banquet and will be held on March 1. Gold seal diplomas will be presented to the foremen, it is said, who have not missed attendance at a meeting of the series, and silver seal diplomas to those who have not missed more than three meetings.

Slag

Buffalo Slag Co., Buffalo, N. Y., it is said, expects to have the new slag crushing unit it is erecting at Erie, Penn., as announced in the January 22 issue of "Rock Products," ready for operation some time this spring. The plant is being constructed of concrete and steel and will be 40x60 ft. and 2½ stories high.

Cement

Lehigh Portland Cement Co. is reported to have taken options on limestone deposits near Mifflinburg, Union county, Penn. These deposits are close to property which several years ago was surveyed for roadstone and lime possibilities by New York interests.

Glens Falls Portland Cement Co., Glens Falls, N. Y., re-elected the following officers at the annual meeting held February 1: President, George F. Bayle, Sr.; vice presidents, Byron Lapham and George F. Bayle, Jr.; secretary, John E. Parry; treasurer, Arthur W. Sherman; directors, the officers with Frank W. Waite and Theodore F. Kalbfleisch, Sr.

Sandusky Cement Co., Cleveland, Ohio, is using the radio as a means of advertising recently with much favorable publicity as the direct result. Every other Thursday the Sandusky company has the Cleveland Symphony Orchestra broadcast a program over Station WTAM, that city. The programs are advertised by the company by means of an attractive 24-page booklet, 3¼x5 in. in size, which details two of the programs and gives some interesting data as to the various compositions.

Dewey Portland Cement Co., Kansas City, Mo., is said to have the new crushing plant which it is erecting at Davenport, Ia., practically com-

pleted. The concrete foundations have been finished and the steel for the superstructure is now being put in place.

California Portland Cement Co., Colton, Calif., is building a large private garage at its plant here for the use of its employes.

Cement Products

Indiana Concrete Pipe Co., Gary, Ind., recently incorporated, has purchased the plant of the Union Railway Equipment Co. at Hammond, Ind., and will remodel it for use in the manufacture of concrete sewer pipes. The railway equipment building is 100x200 ft. in size, and is located on a 35-acre tract in eastern Hammond. Approximately 100 men will be employed in the plant by the pipe company. Steven Harriman is president; Joseph J. Million, secretary.

Terre Haute Duntile Co., Terre Haute, Ind., has filed a certificate to change its name to the Terre Haute Concrete Products Co. The change was authorized at the last meeting of stockholders.

Severino Seghieri has engaged in business in San Francisco, Calif., under the name of Bay Concrete Co.

Rib-Stone Concrete Corp., Le Roy, N. Y., held its annual meeting recently and elected Donald Woodward, J. Leonard Heimlich and George E. Priest as directors for the coming year.

Alamo Concrete Pipe Co., Gonzales, Texas, is said to have let the contract to Walsh & Burney, San Antonio, for a one-story, 100x170-ft. frame factory building, T-shape, concrete floor, at San Antonio, Texas, for the manufacture of reinforced concrete pipe. The estimated cost is placed at $30,000 with machinery.

Southern Decorative Supply Co., Birmingham, Ala., organized last August, is reported to be doing a fine business at 920 First Ave. N. The company produces ornamental plaster, exterior and interior composition, art stone mantels, travertine show window backgrounds and other products along this line. William Grant is manager.

Hollywood Fine Art Stone Co. has engaged in business at 9065 Santa Monica Blvd., Los Angeles, Calif., the members of the firm being Horace J. Kelley and Louis G. Peeters.

Miscellaneous Rock Products

United Talc and Crayon Co., Glendon, N. C., is reported to have acquired talc mines in Moore county, covering about 100 acres. Plans for developing the property are now under consideration. A. Luff is president.

Micolithic Products Co., Houston, Texas, will start work, it is said, erecting a $70,000 plant within the next 60 days, to grind micolithic products to be used for stucco and cement flooring. The company's mines are located in El Paso and Hudspeth counties.

Kansas City Asphalt Mining and Milling Co., Kansas City, Mo., expects to open an office in the Condict building at Liberal, Mo., soon. The work of developing the company's 480 acres at Liberal, which was announced in the January 22 issue of "Rock Products" as being under way, is going ahead rapidly, it is said. In addition to a hoist, crusher and rolls already purchased, a 125-hp. boiler and a steam engine have been installed. A 20-ft. shaft has been cribbed and material is being moved onto the grounds for the erection of a tipple.

Personals

Henry F. Koch, president of the Koch Sand and Gravel Co., Evansville, Ind., has purchased the controlling interest in the Evansville Wimsett system, a bank in that city, according to a report, and has been elected president of the bank. Bert Koenig, who is secretary of the Koch Sand and Gravel Co., was chosen vice president.

S. E. Burnham, Boise, Idaho, one of the pioneer contractors of the Northwest, has become associated with the contracting firm of Morrison & Knudson and will have charge of that company's commercial gravel plant at Boise.

Ralph M. Boger, Lebanon, Penn., has been appointed superintendent of the Annville Lime Co., Annville, Penn.

H. C. Shields, formerly connected with various portland cement enterprises, is now sales engineer for the Weller Manufacturing Co., Chicago, Ill.

Col. H. J. Weeks has resigned as secretary and assistant general manager of the Signal Mountain Portland Cement Co., Chattanooga, Tenn. He has been succeeded as assistant general manager by R. R. Caskey and as a member of the board by R. A. Drum. Col. Weeks was in charge of operations at Chattanooga for about two years.

Obituaries

Hugh Dent, for six years engineer and electrician at the Havre de Grace, Md., plant of the Standard Lime and Stone Co., Baltimore, Md., died February 2 at the Havre de Grace Hospital of meningitis. He is survived by a widow, Mrs. Madeline Dent, and four children, also three brothers.

Harvey T. Stinson, aged 54, vice president of the Queen City Crushed Stone and Sand Co., Cincinnati, Ohio, died recently in Christ Hospital, that city, following an operation for appendicitis. He leaves his widow, Mrs. Eliza Stinson, and four children. Interment was made in the Miamisville cemetery.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Automatic Pulverizers and Air Separators. Catalog No. **19** on modern automatic and pulverizing equipment with air separation. Engineering data, efficiency tables, illustrations and details of construction and description of complete air separating plant. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.

Air Filters. "Midwest Detail Sheets" and "Filters for Compressors and Engines," looseleaf pamphlet issued by MIDWEST AIR FILTERS, INC., Bradford, Penn.

Power Shovel. Descriptive bulletin on the Erie "Gas + Air" shovel and crane. Specifications, data, illustrations, etc. ERIE STEAM SHOVEL CO., Erie, Penn.

Cement Products Machinery. Bulletin describing and illustrating strippers, power feeders and the machines manufactured by the ANCHOR CONCRETE MACHINERY CO., Adrian, Mich.

Mine and Industrial Track Equipment. Catalog **K** describing products such as frogs, switches, switch stands, crossings, steel ties, light rails, mine cars and other equipment. Turnout data, formulas for curving rail, American Mining Congress data and conversion tables. BETHLEHEM STEEL CO., Bethlehem, Penn.

Short Cuts to Power Transmission. Handy booklet on the use and care of belts. Description of belt fasteners, steel belt lacing, etc., manufactured by the FLEXIBLE STEEL LACING CO., Chicago.

Horizontal Quarter Turn Drives. Report on transmission capacity of this type of drive as compared with normal horizontal drives. THE LEATHER BELTING EXCHANGE, Philadelphia, Penn.

Ball and Tube Mills. New catalog on grinding of many kinds of raw materials, illustrating and describing latest and modern practices in operation of mills. Features closed circuit grinding with centrifugal separators. Data on automatic feeders, mill linings, pebbles, grinding balls, and capacity tables for tube and ball mills. PATTERSON FOUNDRY AND MACHINE CO., East Liverpool, Ohio.

Power Shovel. Bulletin **2624** on the Osgood 1¼-yd. gasoline or electric shovel. Specifications, working ranges, construction details and illustrations of design. THE OSGOOD CO., Marion, Ohio.

Manufacturers

F. L. Smidth & Co., New York City, designed and had charge of installation of the 330-ft. cement kilns at the Birmingham, Ala., plant of the Phoenix Portland Cement Co. They also designed and are installing the 343-ft. kilns at the Richard City, Tenn., plant of the Pennsylvania-Dixie Cement Corp. The same company has charge of the conversion of the Mason City, Iowa, plant of the Lehigh Portland Cement Co. from dry to wet process.

International Combustion Engineering Corp. announces its removal with its American subsidiaries, Combustion Enginering Corp., Ladd Water Tube Boiler Co. and Raymond Bros. Impact Pulverizer Co., Inc., to its new building at Madison Ave., New York City. A part of the space in the new building will be used for the development of various processes under way, which include low temperature coal distillation, power plant development, etc. The material growth of the company necessitated the increased floor space, of which there is said to be about 600,000 sq. ft. in the new building. The International company has recently acquired the capital stock of the Heine Boiler Co., one of the oldest and leading water-tube boiler manufacturers in the United States. This acquisition gives the International Combustion Engineering Corp. large boiler shop facilities at St. Louis, Mo., and Phoenixville, Penn. All types of water-tube boilers will be manufactured at St. Louis, including the new Sinuous Header type recently placed on the market. The manufacture of the Ladd water-tube boilers and the new Combustion steam generators will also be centered in the St. Louis plant.

Blaw-Knox Co., Pittsburgh, Penn., announces the appointment of John C. White as sales manager of the Steel Grating and Flooring Department.

Hill Clutch Machine and Foundry Co., Cleveland, Ohio, recently appointed Charles C. Phelps, 473 Getty Ave., Paterson, N. J., as sales engineer for the Metropolitan New York and northern New Jersey district.

E. I. du Pont de Nemours & Co. recently held an interesting technical convention at Wilmington, Del., under the direction of the Explosives Department. Officials of the company, of the Explosives Department, of the chemical, manufacturing, and sales forces were in attendance. This convention was attended by a representative of Nobel Industries, Ltd., of England, and by representatives of the Canadian Explosives, Ltd., of Montreal, and the Canadian Giant, Ltd., of Vancouver, Canada.

Lidgerwood Mfg. Co., New York, N. Y., has established an office and warehouse at Jacksonville, Fla., 401 Barnett National Bank Bldg., in charge of L. C. Hastings.

Fifty Years of Service

FROM a small beginning in a makeshift plant at Mt. Pleasant, Iowa, fifty years ago, to the modern plant that covers 48 acres of ground at Aurora, Ill., is the record of the Western Wheeled Scraper Co., manufacturers of dump cars and earth and stone handling equipment. The story of this company and its achievements are contained in an attractive jubilee catalog "Fifty years of Service," brought out in honor of the occasion. With reference to this catalog, it is interesting to compare the earlier equipment, then in the formative stage, with the large

Jubilee catalog to commemorate golden anniversary

and well-designed machinery now in use.

Originally founded to carry on the manufacture of wheel scrapers, the Western company has expanded along with the industry of the country until now the wheeled scraper is just one of many types of earth moving machines made. The organizers of the company have all passed on but members of their families still conduct the business, an unusual thing in these days.